SERVICE MANUAL

7.62-mm Kalashnikov Rifle (AK)

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GENERAL INFORMATION

PURPOSES AND CHARACTERISTICS OF THE AUTOMATIC RIFLE

The 7.62-mm Kalashnikov automatic rifle (AK) (fig. 1) is a powerful individual automatic weapon designed to destroy enemy personnel at short distances.

The rifle can be employed for both semiautomatic and automatic fire. The rifle is designed basically for full automatic fire.

When firing automatic fire in short bursts, the rifle is capable of destroying collective and individual targets at ranges of up to 500 meters. The rifle can be fired most effectively at ranges of up to 300 meters.

In firing the rifle on semiautomatic fire, best results are obtained at ranges of up to 400 meters. Well-trained riflemen can fire aimed semiautomatic fire at ranges of up to 600 meters. The bullet retains a lethal effect at ranges of up to 1500 meters.

Deliverable rate of fire:

--90 to 100 rounds per minute in short bursts;
--up to 40 rounds per minute in semiautomatic fire.

The rifle fires 7.62-mm rounds M1943.

The principal characteristics of the automatic rifle are listed in table form in Appendix 1.

BRIEF DESCRIPTION OF THE CONSTRUCTION OF THE AUTOMATIC RIFLE

The 7.62-mm Kalashnikov automatic rifle is a gas-operated weapon, in which the gas is channeled through a special port in the stationary barrel and reacts on a piston.

The bore is sealed by rotation of the bolt and engagement of the bolt locking lugs with locking lugs on the receiver.

The rifle is fed from a curved box magazine with a capacity of 30 rounds.

The rear sight is of the curved ramp type, and is designed for fire of up to 800 meters.

The firing mechanism is of the hammer type, and is actuated by means of a spring. The rifle is equipped with a selector for changing from semiautomatic fire to full automatic and the reverse. The selector also acts as a safety.

The rifle is provided with either a wooden or a folding metal stock. In the traveling position, in movement on skis, and in parachute jumps, the metal stock is folded beneath the receiver (fig. 2). As a rule, the rifle is fired with the stock unfolded; however, if time does not permit the unfolding of the stock, the rifle may be fired with the stock folded.

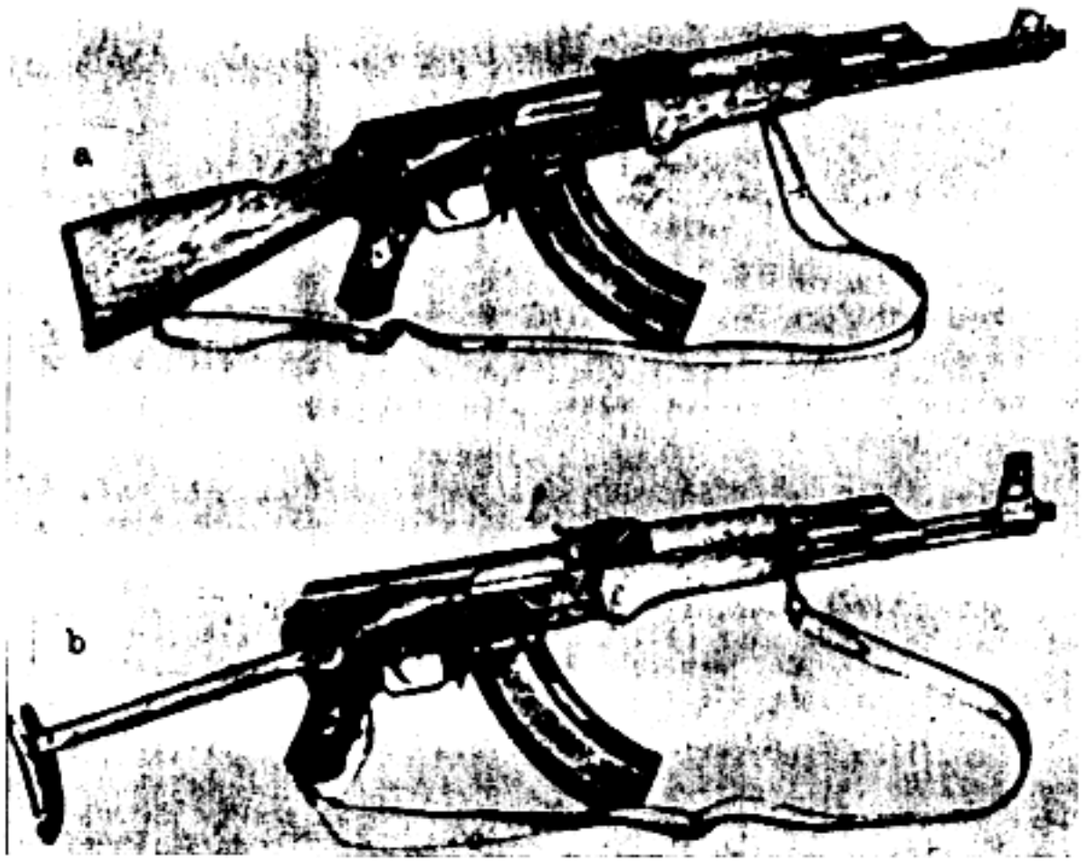

Figure 1. General view of the Kalashnikov automatic rifle.

a. With wooden stock.
b. With folding metal stock.

Figure 2. Kalashnikov automatic rifle with folding metal stock in folded position.

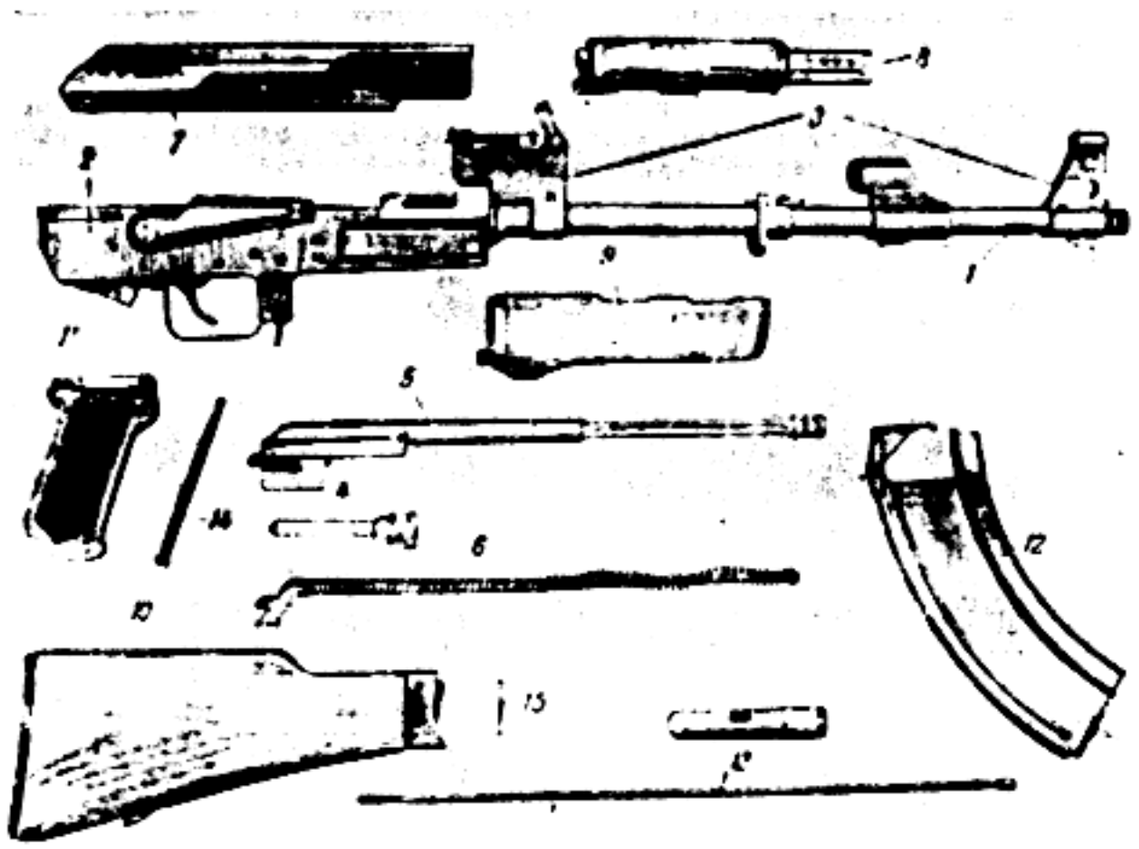

Figure 3. Principal parts of the Kalashnikov automatic rifle.

1 - barrel (1-10); 2 - receiver (assy. 1-1); 3 - sights; 4 - bolt (assy. 3-2); 5 - operating rod (assy. 3-1); 6 - return mechanism (assy. 4); 7 - receiver cover (0-1); 8 - gas tube and hand guard (assy. 1-12); 9 - fore end (assy. 6); 10 - stock (assy. 5); 11 - pistol grip (assy. 8); 12 - magazine (assy. 7); 13 - cleaning rod and accessory case; 14 - pistol grip screw (0-19); 15 - stock pin.

PART ONE

CONSTRUCTION, FUNCTIONING, DISASSEMBLY, ASSEMBLY, AND INSPECTION ON THE AUTOMATIC RIFLE

CHAPTER 1

PARTS AND MECHANISMS OF THE AUTOMATIC RIFLE

The 7.62-mm Kalashnikov automatic rifle consists of the following principal parts and mechanisms (fig.3)*: barrel (1), receiver (2), sights (3), bolt (4), operating rod (5), return mechanism (6), firing and trigger mechanisms, receiver cover (7), gas tube (8) with hand guard, fore end (9), stock (10), with pin (15), pistol grip (11) with screw (14), and magazine (12).

In addition, the rifle is provided with accessories (13) for cleaning and lubricating, disassembly and assembly.

1. BARREL

The barrel (fig.4) serves to direct the flight of the bullet. To the barrel are attached the barrel bushing (1), the front sight base (2), the gas cylinder (3), the fore end band (4), and the rear sight base (5).

The barrel is provided with exterior threads (6) for installing the device for firing blank cartridges; there are cylindrical portions for the front sight base, the gas cylinder, the fore end band, and the rear sight base. A shoulder (7) serves as a support for the barrel when inserted into the receiver. At the rear of the barrel there is a reinforced section (8) over the chamber, and a thread (9) for the receiver.

On the cylindrical portions of the barrel for the front sight base, the gas cylinder and rear sight base, there are semicircular recesses (10, 11 and 12) for pins; on the cylindrical portion for the fore end band there is a semicircular recess (13) for the fore end band lock.

The interior of the barrel consists of the bore, made up of the chamber (14) and the rifled portion (15).

The chamber is connected to the rifled protion by means of a passage (16) which assures smooth engagement of the bullet with the rifling. On the breech face of the chamber there is a

*The following description is of the model with wooden stock. Differences between this model and the model with metal stock are noted later.

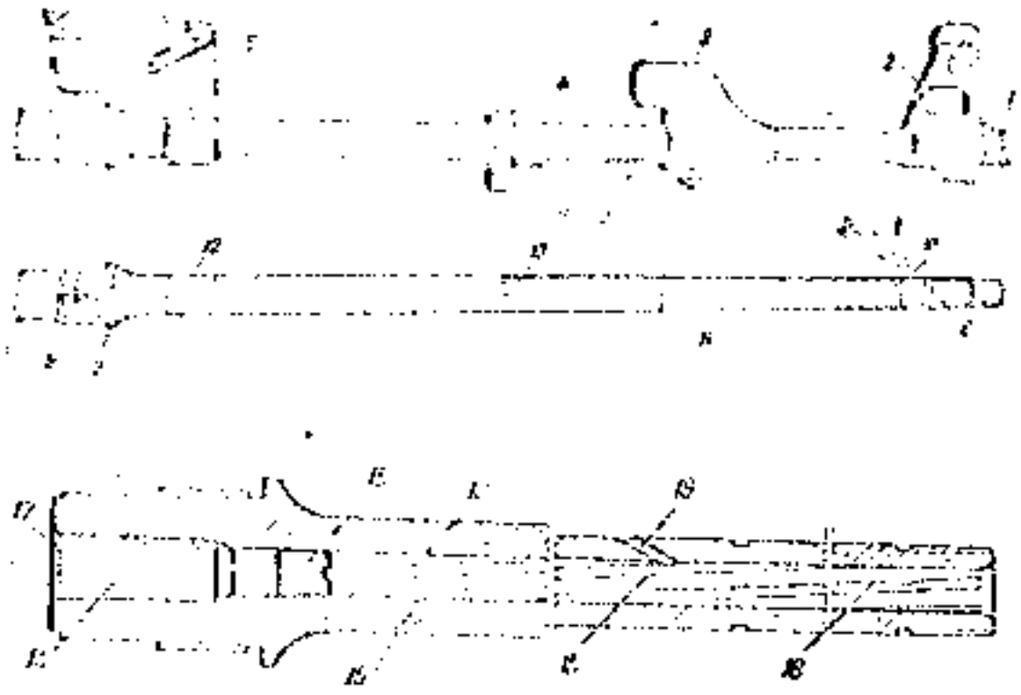

Figure 4. Barrel (A - overall view; B - section).

1 - barrel bushing (0-14); 2 - front sight base (1-30); 3 - gas cylinder (1-29); 4 - fore end band (assy. 1-11); 5 - rear sight base (1-21); 6 - thread for device for firing blank cartridges; 7 - supporting shoulder for barrel; 8 - barrel reinforce; 9 - thread for connecting barrel to receiver; 10 - semicircular recesses for front sight base pins; 11 - semicircular recesses for gas cylinder pins; 12 - semicircular recesses for rear sight base pins; 13 - semicircular recess for fore end band lock; 14 - chamber; 15 - rifled portion; 16 - passage; 17 - bevel; 18 - rifling; 19 - gas port.

ramp (17) for guiding the bullet into the chamber. The rifled portion of the bore has four grooves (18), which originate at the left and continue in a counterclockwise direction. The grooves serve to impart rotary motion to the bullet.

The portions between the grooves are called the lands. The distance between two opposite lands is called the caliber, and is equal to 7.62-mm. In the central portion of the barrel there is a gas port (19) for passing a portion of the gases into the gas cylinder.

The barrel bushing (fig.5) serves to protect the threads on which the device for firing blank cartridges is installed. On the exterior of the barrel bushing there is a shoulder (1) with four recesses (2) for the lock; there are also a circular groove (3) and two recesses (4). The grooves and recesses are designed to hold the hand guard when the bore is being cleaned. The barrel bushing is provided with interior threads (5) for installation on the muzzle.

The barrel bushing lock (fig.6) is located in a recess in the front sight base and consists of a lock (1), spring (2), and pin (3).

The forward edge of the lock enters one of the recesses in the barrel bushing shoulder when the bushing is installed on the barrel, thus preventing the barrel bushing from coming loose.

The lock and spring are retained in the front sight by means of a pin which enters recess (4) of the lock.

The gas cylinder (fig.7) serves to direct the gases which are passed from the bore to the piston.

On the upper portion of the gas cylinder there is a circular edge (1) for fastening the gas pipe to the hand guard; and on the lower portion there are two ports (2) for pins, and a lug (3) for the cleaning rod.

The interior of the gas cylinder is provided with a cylinder (4) into which the gases pass from the bore by means of a gas port (5). Bevel (6) on the forward face of the gas cylinder serves to guide the piston into the gas cylinder, thus preventing the piston from jamming against the face of the gas cylinder.

The gas cylinder fits on the barrel very tightly, and is locked by two pins (7).

Fore end band (fig.8) serves to lock the fore end to the barrel. It has rims (1) for the forward end of the fore end; lug (2) with port (3) for lock; forward swivel (4) for the sling; port (5) for the cleaning rod; notch (6) for the lock lever when the stop ring is locked on the barrel. Lock (7) serves to lock the fore end band on the barrel. It is provided with a lever (8) and recess (9).

Figure 5. Barrel bushing (0-14).

1 - shoulder; 2 - recess; 3 - circular groove; 4 - recesses; 5 - threads.

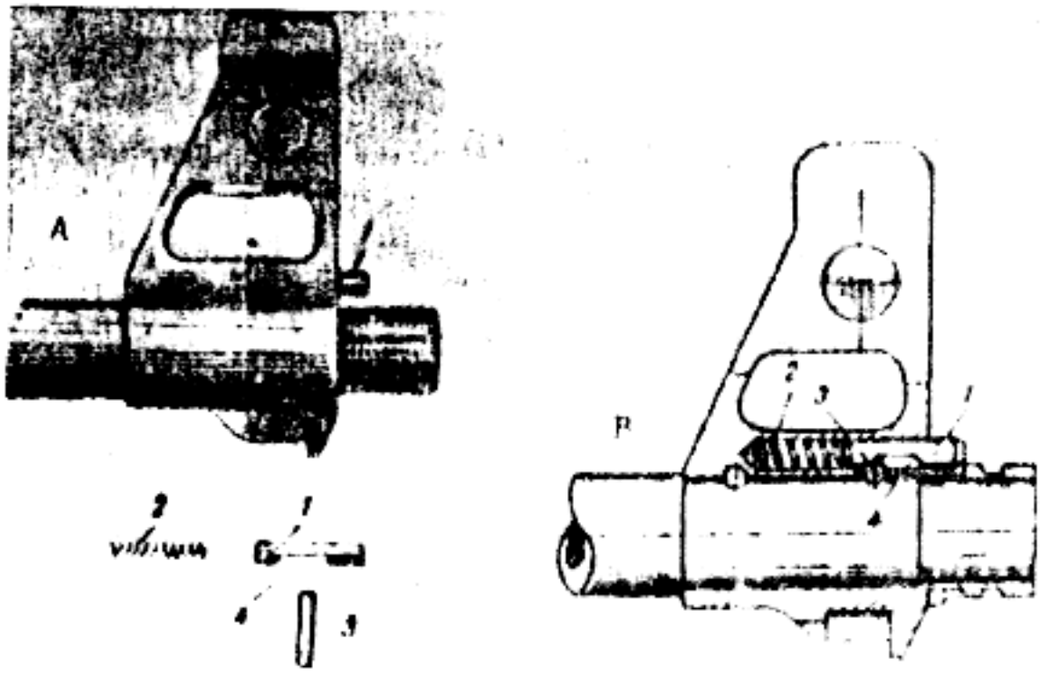

Figure 6. Barrel bushing lock.

A. Lock in assembled and disassembled views with barrel bushing removed.
B. Sectional view with bushing installed.

1 - lock (1-37); 2 - lock spring (1-38); 3 - pin; 4 - recess.

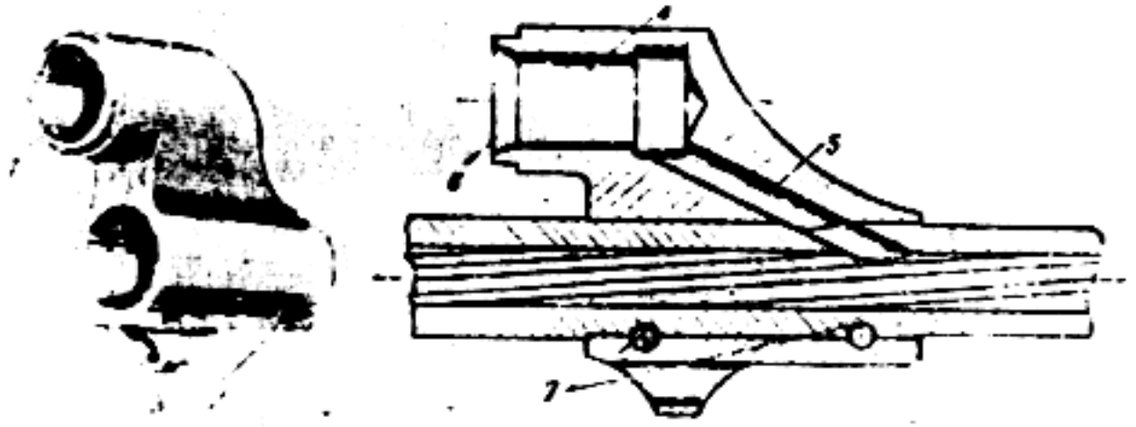

Figure 7. Gas cylinder (1-29). (Overall and sectional views)

1 - circular edge; 2 - ports for pins; 3 - lug for cleaning rod; 4 - cylinder; 5 - gas port; 6 - bevel for guiding piston; 7 - pins.

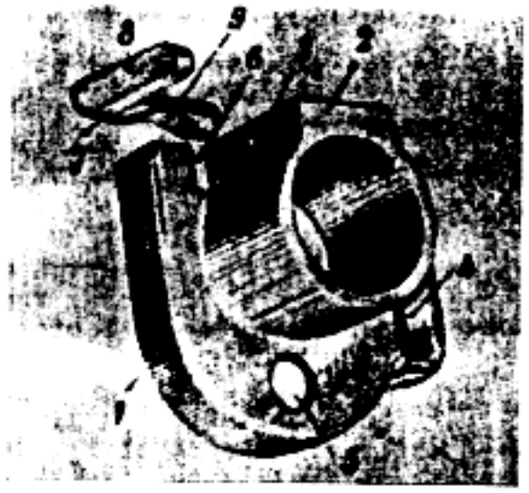

Figure 8. Fore end band with lock (assy. 1 -11).

1 - rims; 2 - lug; 3 - port for lock; 4 - forward swivel; 5 - port for cleaning rod; 6 - notch for lock lever; 7 - lock (1-28); 8 - lock lever; 9 - recess.

The fore end band is locked on the barrel when the lock lever is turned to the rear, and the round portion of the lock enters recess (13) in the barrel (see fig. 4). The fore end band can be moved along the barrel when the lever is moved forward and the lock recess is turned towards the barrel.

2. RECEIVER

The receiver (fig. 9) serves to connect the parts of the automatic rifle and to direct the motion of the bolt and the operating rod. On the top of the receiver there are guides (1) for guiding the operating rod. The guides are provided with recesses (2) for passing the bolt lugs and recesses (3) for passing the operating rod lugs when the operating rod and bolt are being connected to the receiver. The right guide is provided with a semicircular recess (4) and bevel (5) for preventing the cartridge cases from striking the receiver in extraction.

To the bottom of the receiver are fastened a safety bracket (6) and pistol grip base (7).

In addition, in the bottom of the receiver there is an opening (8) for the magazine, and an opening (9) for the trigger.

On the right wall of the receiver there is a lug (10) and a lug (11) for reinforcing the receiver wall; lug (12) for limiting the safety lever; recesses (13 and 14) for stopping the selector; opening (15) for installing the selector in the receiver (in the round portion of the opening is placed the right trunnion of the selector lever).

Near recess (13) are the letters AV, which correspond to the selector setting for automatic fire, and near recess (14) are the letters OD* which correspond to the selector setting for semiautomatic fire.

On the left wall of the receiver there is a lug (16) for reinforcing the upper portion of the receiver, an opening (17) for the left trunnion of selector lever. In the forward portion of the left wall of the receiver are the serial number of the automatic rifle and the name of the manufacturer.

In the right and left walls of the receiver there is an opening (18)for the hammer pin, opening (19) for the trigger pin, and opening (20) for the automatic trigger pin.

In the top portion of the receiver (fig. 10) there is a groove (21) for the rear portion of the rear sight base; lug (22) in which the left locking lug is formed; shoulder (23)

*The latin letters AV appear as Cyrillic АВ on the Soviet model, as 娘 on the Chicom model, and as latin L on the Chicom "export" model. The latin letters OD appear as Cyrillic ОД on the Soviet model, as 半 on the Chicom model, and as latin D on the Chicom "export" model.

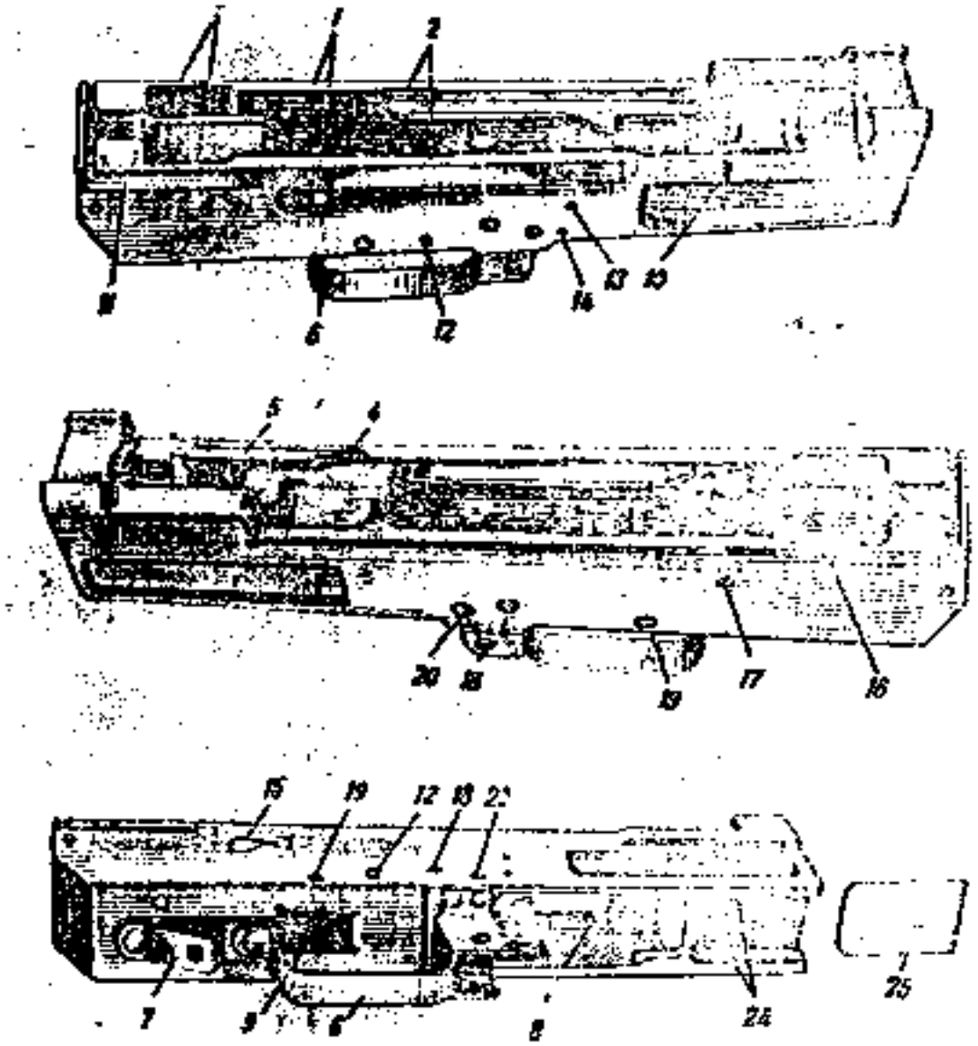

Figure 9. Receiver (assy. 1-11).

A. Right side; B. Left side; C. Bottom.

1 - guides; 2 - recesses for passing bolt lugs; 3 - recesses for passing operating rod lugs; 4 - semicircular recess; 5 - bevel; 6 - safety bracket; 7 - pistol grip base; 8 - magazine opening; 9 - trigger opening; 10, 11 - lugs for reinforcing receiver walls; 12 - lug for limiting the safety lever (1-20); 13, 14 - recesses for stopping the selector; 15 - opening for selector lever; 16 - lug for reinforcing upper portion of receiver; 17 - opening for left trunnion of selector lever; 18 - opening for hammer pin; 19 - opening for trigger pin; 20 - opening for full automatic sear; 24 - recess for fore end; 25 - cover (1-7).

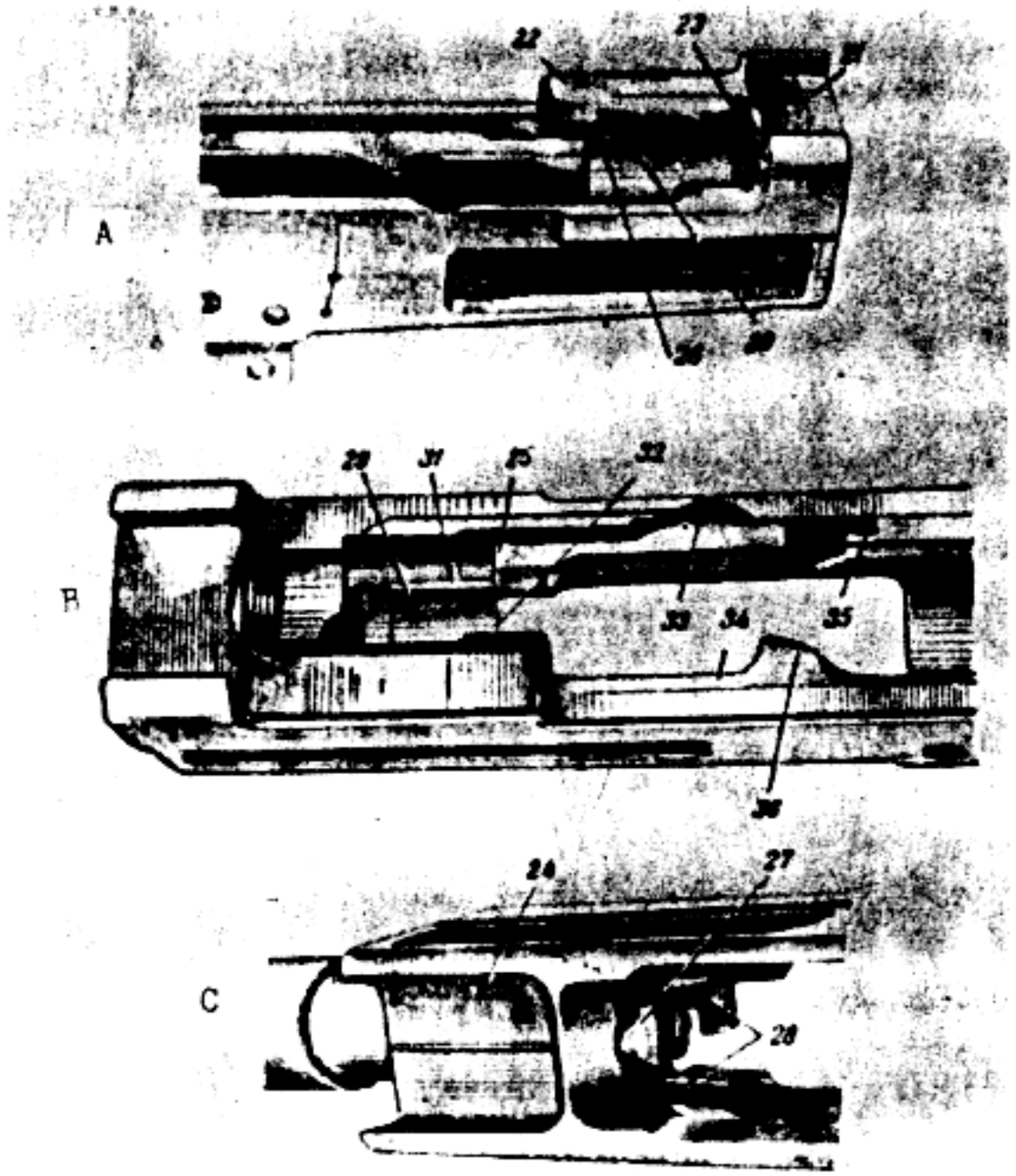

Figure 10. Forward portion of receiver.

A. Rifled side view; B. Left side view; C. Bottom.

21 - groove for the rear sight base; 22 - lug; 23 - shoulder for limiting motion of operating rod; 24 - recess for fore end; 25 - right locking lug; 26 - left locking lug; 27 - recess in which forward portion of magazine is attached; 28 - shoulders for limiting movement of magazine; 29 - cam surface (1-9); 30 - cam surface screw bevel; 31 - right edge of cam surface; 32 - cam surface guide end; 33 - right guide; 34 - left guide; 35 - groove for full automatic sear lever; 36 - extractor.

which limits the motion of the operating rod and absorbs blows of the operating rod when the latter moves to the extreme forward position.

In the forward portion the receiver is provided with a recess (24) with grooves for cover (25) (see fig. 9), which closes this recess.

Recess (24) forms a recess for holding the fore end. On the inside of the forward portion of the receiver there is thread for attaching the barrel; locking lugs (24 and 25) with which the bolt locking lugs engage when the bore is being sealed; recess (27) for holding the forward portion of the magazine; and shoulders (28), which limit the motion of the magazine upwards when it is being connected to the rifle, and cam surface (29), which is riveted to the receiver.

The cam surface serves to rotate the bolt a certain amount when the bore is being sealed, to limit rotation of the bolt at the end of its motion, and to guide the cartridge into the chamber.

On the cam surface there is a cam (30), which engages with the left locking lug of the bolt, for the purpose of preliminary rotation of the bolt when the bore is first being sealed.

At the end of the sealing action, rotation of the bolt is limited by the right edge (31) of the cam surface.

The edge (32) on the rear face of the cam surface guides the round into the chamber.

The interior of the receiver is provided with right guide (33) and left guide (34) for guiding the bolt. In the right guide there is a groove (35) for the upper portion of the full automatic sear lever, and in the left guide there is an extractor (36) for extracting the cartridge cases. In their forward portion, the guides have projections and a camming surface which serve to guide the cartridge as it leaves the flanges of the magazine, and semicircular recesses, which contain the central cylindrical portion of the bolt.

The receiver rear end (fig.11) is the back plate, which receives the blows from the operating rod as the latter moves to the extreme rear position.

In the upper portion of the back plate there is a groove (37) for holding the heel of the return spring guide tube and a groove (38) for the rear edge of the receiver cover; at the rear, there is a groove (39) for holding the stock and hole (40) for the stock pin.

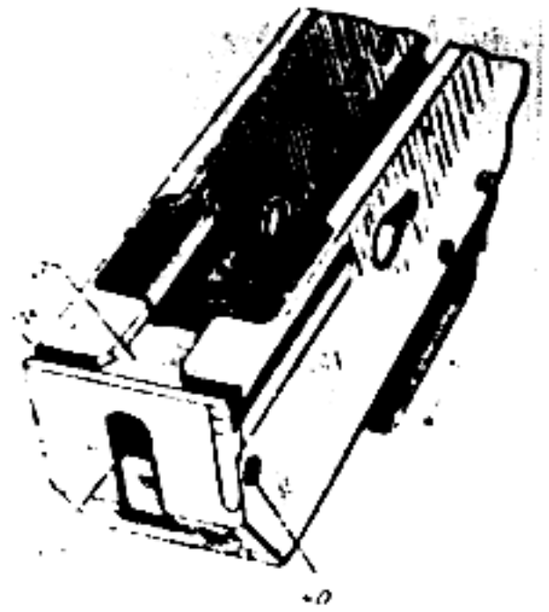

Figure 11. Rear end of receiver (back plate).

37 - groove for holding heel of guide tube; 38 - groove for rear end of receiver cover; 39 - groove for holding stock; 40 - hole for stock pin.

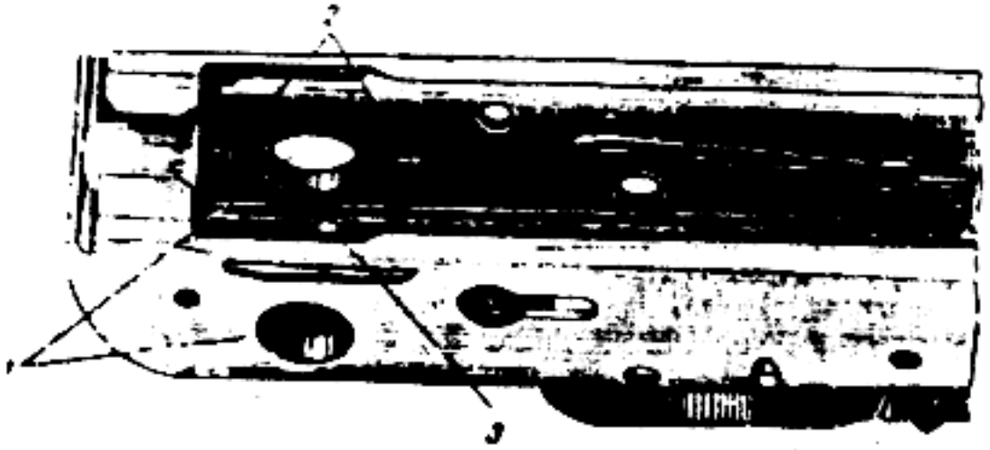

Figure 12. Rear portion of receiver of automatic rifle with folding metal stock.

1 - holes for stock pin; 2 - holes for stock catch; 3 - hole for more convenient removal of catch pin.

The receiver of the automatic rifle with folding metal stock (fig. 12) has holes (1) in the rear portion for the stock pin, holes (2) in the left wall for the stock catch, and holes (3) for convenient removal of the catch pin.

The magazine catch (fig. 13) with spring serves to hold the magazine in the receiver. It consists of a catch (1), spring (2) and pin (3).

On the catch there is a stop (4) and hole (5) for the pin.

The catch with spring is connected with the safety (trigger) guard by means of pin (3).

The upper edge of the catch is pressed forward by the spring, causing the end (6) to be engaged by the magazine stop to retain the magazine in the receiver.

There are also automatic rifles with stamped receiver (fig. 14). The stamped receiver has the following construction: An insert (1) is welded to the forward part of these receivers, and back plate (2) to the rear portion.

To the bottom of the receiver there are welded a safety (trigger) guard (3) and pistol grip base (4).

Inside the receiver there are welded guides, the upper edges of which serve as guides for the bolt, and the lower edges as a reinforcement for the receiver walls around the hole for the hammer pin.

The upper edges of the receiver are bent inward and form cam surfaces (6) for guiding the operating rod.

The insert of the stamped receiver (fig. 15) is provided with threads (1) for the barrel; shoulders (2 and 3); forward portion of bolt guides (5 and 6); extractor (7); groove (8) for the rear sight base; notch (9) for the fore end; recess (10) and shoulders (11) for holding the magazine.

The notch for the fore end is covered by the lower portion of the receiver wall.

The back plate of the stamped receiver (fig. 16) has a groove (1) for holding the heel of the return spring guide tube, groove (2) for rear edge of the receiver cover; recess (3) for holding the forward edge of the stock; two projections (4 and 5) with holes for holding the stock by means of screws.

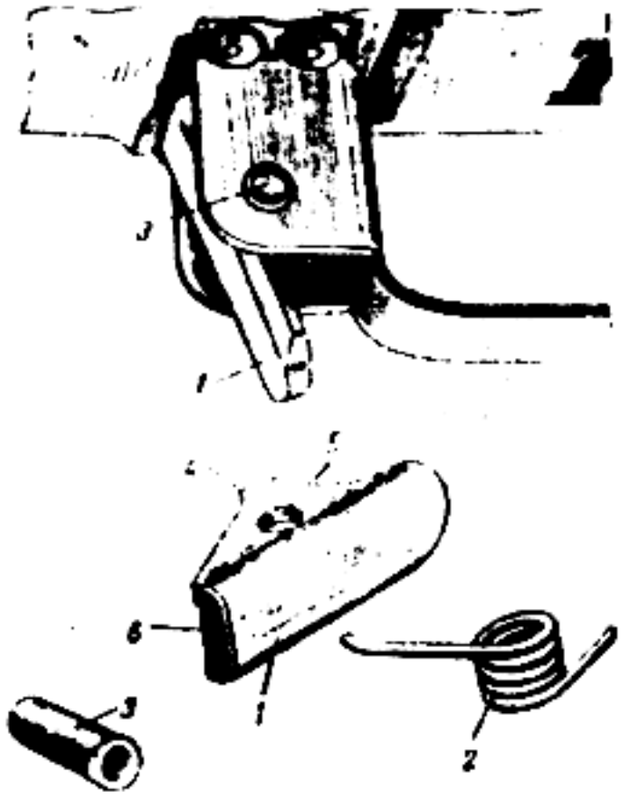

Figure 13. Magazine catch, assembled and disassembled.

1 - catch (0-11); 2 - catch spring (0-12); 3 - catch pin (0-13); 4 - catch stop; 5 - hole for pin; 6 - upper end of catch.

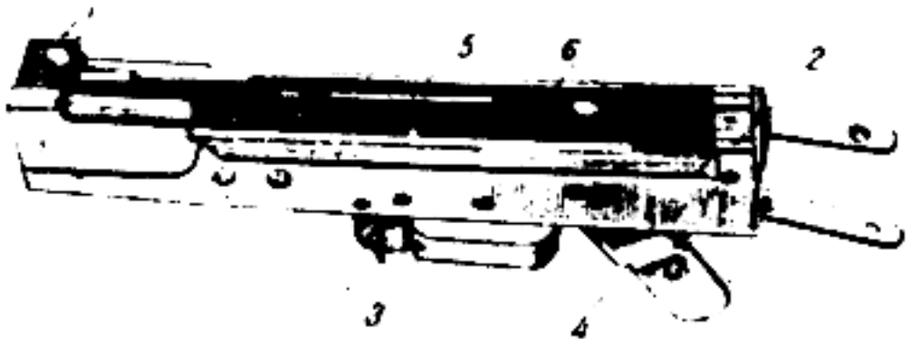

Figure 14. Stamped receiver (assy. 1-1).

1 - insert (assy. 1-7); 2 - back plate (1-3); 3 - safety (trigger) guard; 4 - pistol grip base; 5 - guide; 6 - guide surfaces.

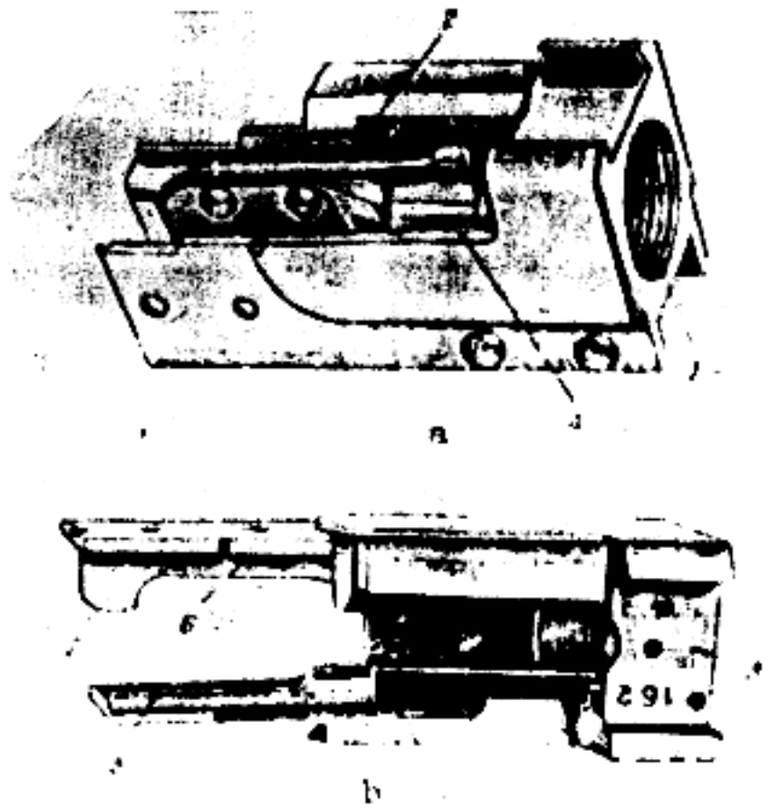

Figure 15. Insert of stamped receiver (assy. 1-7).

A. Right view; B. Top view; C. Bottom view.

1 - thread for barrel; 2, 3 - shoulders; 4 - cam (1-9); 5, 6 - guides; 7 - extractor; 8 - groove for rear sight base; 9 - notch for fore end; 10 - recess; 11 - shoulders.

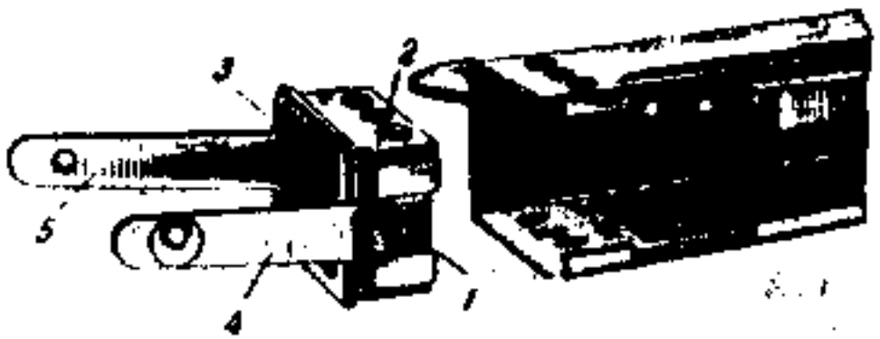

Figure 16. Back plate (1-3) of stamped receiver.

1 - groove for holding heel of guide; 2 - groove for receiver cover rear end; 3 - recess for holding forward edge of stock; 4, 5 - projections of back plate with holes.

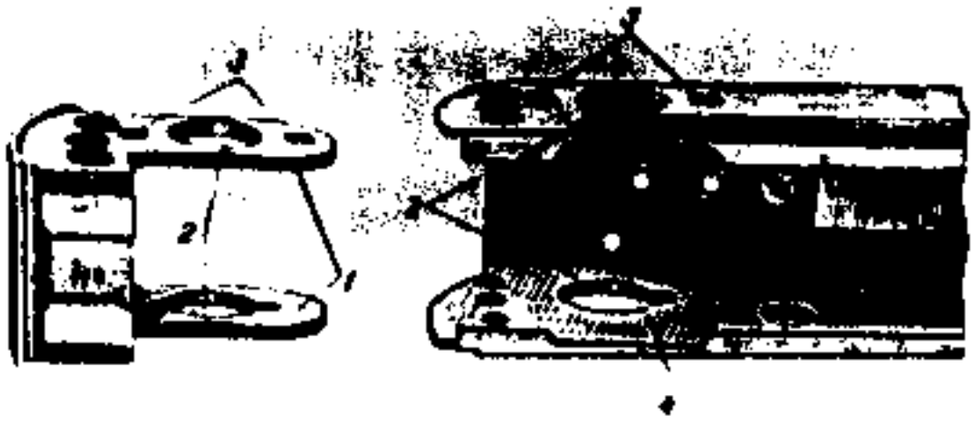

Figure 17. Back plate (1-49) of stamped receiver with folding metal stock.

1 - lugs; 2 - holes for stock pin; 3 - square holes for stock catch; 4 - hole for facilitating removal of stock catch pin.

In automatic rifles with stamped receiver and folding metal stock (fig. 17), the back plate has two lugs (1) with holes (2); the receiver has the same kind of holes. They hold the stock pin, and the lugs reinforce the receiver walls.

Also, in the left wall of the receiver and in the left lug there are square holes (3) for the stock catch, and in the bottom of the receiver there is a hole (4) for facilitating removal of the catch pin when the stock is being removed.

3. SIGHTS

The sights are used to aim the rifle at the target for fire at various ranges. They are mounted on the barrel and consist of the front and the rear sight.

The rear sight (fig. 18) consists of a base (1), on which there are sectors; sight leaf (2), sight leaf spring (3), slide (4); slide catch (5) and spring (6).

The sight base (fig. 19) has a lug (1), by means of which the sight is mounted on the barrel; hole (2) for the pin which holds the base on the barrel; hole (3) for the gas tube lock; hole (4) for passing the operating rod; semicircular groove (5) for holding the receiver cover plate; notch (6) and recess (7) for holding the gas tube.

The gas tube lock (8) has a lever (9), by means of which the lock is rotated; and a recess (10) for passing the rear face of the gas tube when it is being removed from and attached to the barrel.

In the closed position, the lock is stopped by a lever, on which there is a stop; the latter enters a special recess (11) in the right side of the sight base.

The sectors are integral with the sight base and are used to set the desired ranges. The sectors have a lug (13) for connecting the sight leaf.

The sight leaf (fig. 18) has odd numbers inscribed on the right side, which correspond to ranges of 100 to 700 meters, and on the left side there are inscribed numbers 2 to 8, which correspond to ranges of 200 to 800 meters. On the left side of the sight leaf is the letter "P".* This graduation is the constant (battle) setting of the sight; with this setting, the slide is located as far to the rear as possible.

The rear sight leaf has a sight bar with rectangular notch, notches (8) for the catch teeth, longitudinal notch (9) for more exact indexing of the inscribed numbers, trunnions (10) for holding the sight leaf to the sight base.

*The latin letter P appears as Cyrillic П on the Soviet and Chicom models; it appears as latin D on the Chicom "export" model.

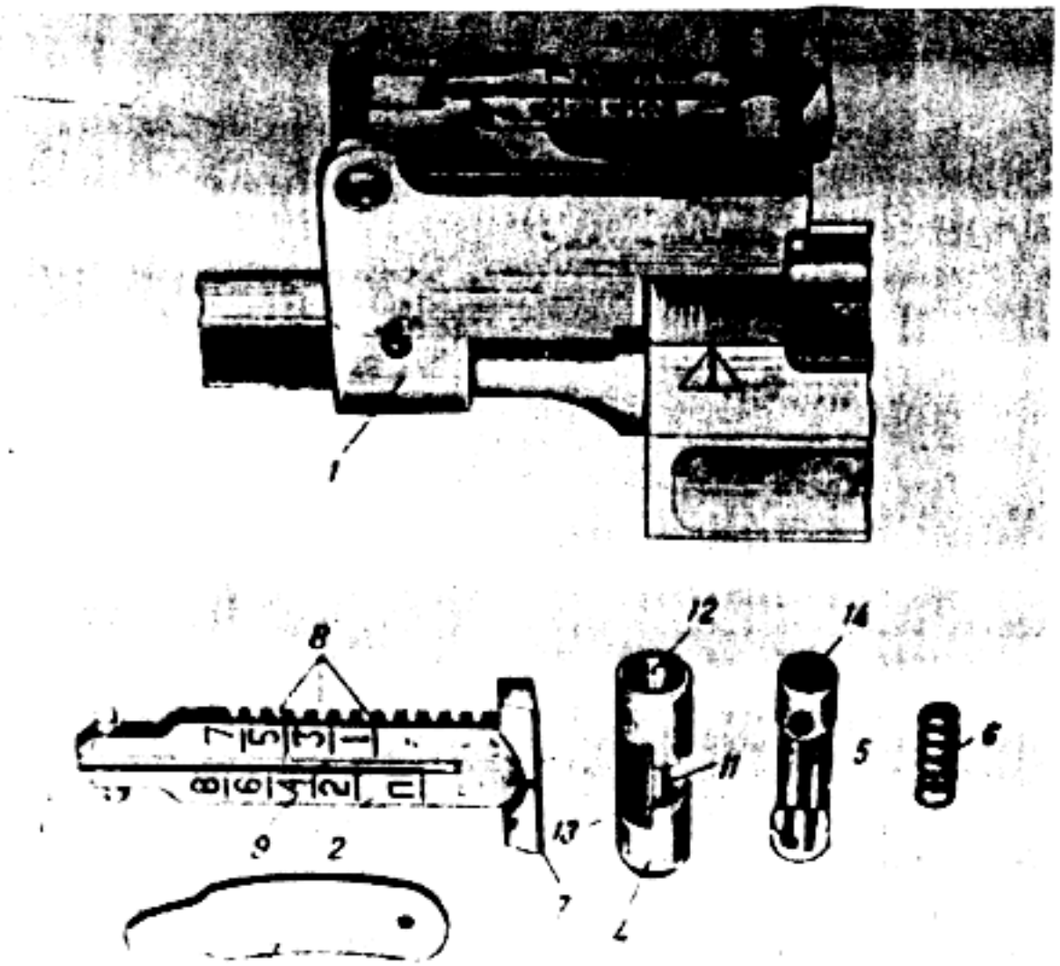

Figure 18. Rear sight, assembled and disassembled.

1 - rear sight base (1-21); 2 - sight leaf (2-1); 3 - sight leaf spring (0-23); 4 - slide (2-2); 5 - slide catch (2-3); 6 - slide catch spring (2-4); 7 - sight bar; 8 - notches for slide catch teeth; 9 - longitudinal notch; 10 - trunnions; 11 - transverse groove for connection with sight leaf; 12 - hole for catch; 13 - recess for spring catch; 14 - catch button.

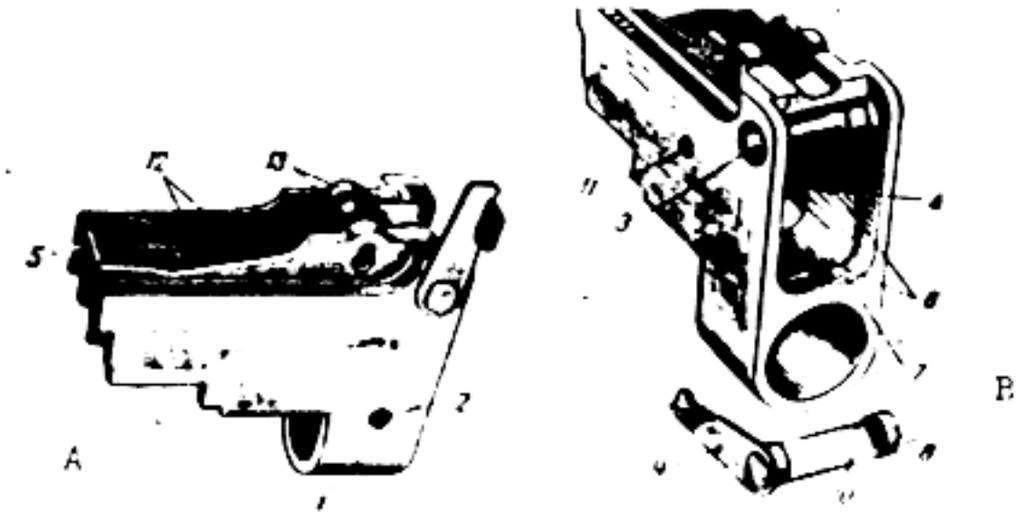

Figure 19. Rear sight base (1-21).

A. Right view; B. Front view.

1 - lug; 2 - hole for pin; 3 - hole for lock; 4 - opening for passing operating rod; 5 - semicircular groove for receiver cover; 6 - notch for gas tube; 7 - recess for gas tube; 8 - gas tube lock; 9 - lock lever; 10 - recess for passing rear face of gas tube; 11 - recess for lock; 12 - sectors; 13 - lug for connecting sight leaf.

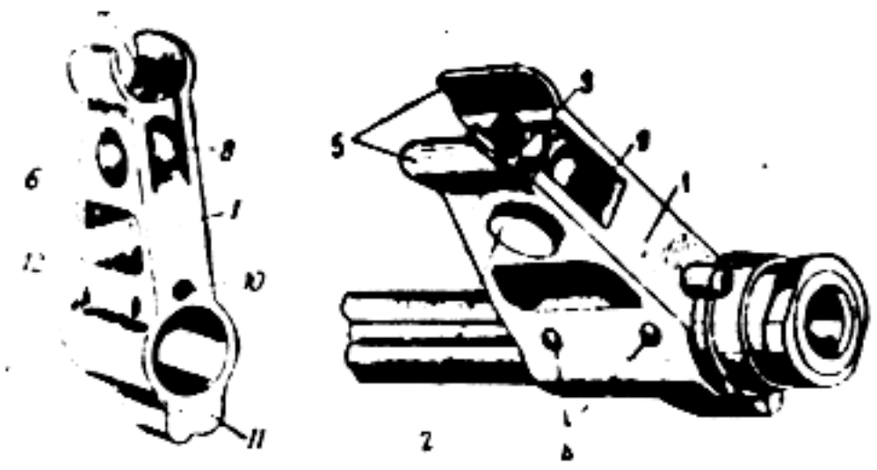

Figure 20. Front sight base, assembled.

1 - front sight base (1-30); 2 - stud (1-31); 3 - front sight (1-32); 4 - pins; 5 - front sight ears; 6 - hole for stud; 7 - oval-shaped recess for front sight; 8 - front hole; 9 - alignment index; 10 - recess for barrel bushing lock; 11 - stop with recess for cleaning rod head; 12 - hole for decreasing weight of base.

The spring (3) holds the sight leaf on a particular setting, on the sectors of the sight base.

The slide (4) has a transverse groove (11) for connecting to the sight leaf, hole (12) for the catch, and recess (13) for the catch spring.

The slide catch (5) has a button for disengaging the teeth of the catch from the notches in the sight leaf when pressed by the fingers. Catch spring (6) holds the catch teeth on the notches of the sight leaf.

The front sight base and front sight (fig. 20). The front sight (3) is threaded into the stud (2), which is located in the front sight base (1).

The front sight base is held tightly to the barrel by means of pins (4). The base is provided with protecting ears (5), transverse hole (6) for holding the stud, oval-shaped recess (7), which permits the front sight and the slide to be moved together in the base, front hole (8); on the beveled wall of the latter there is an alinement index (9). In addition, the base also has a recess (10) for the barrel bushing lock; below there is a stop (11) with a recess for holding the cleaning rod head; hole (12) for decreasing the weight.

The front sight (fig. 21) is provided with a threaded portion (1) for screwing into the stud; in the threaded portion there is a longitudinal groove (2) for the purpose of providing elasticity to prevent the sight from becoming loose; in the upper portion of the sight there are flat recesses (3) for the key.

The front sight stud (fig. 22) is used to move the front sight from side to side when the rifle is being checked for line of sighting. In it there is a threaded hole (1) for receiving the front sight and an alinement index (2), which is engraved in the base and the slide at the same time at the factory after the sights are alined.

The front sight safety (fig. 20) protects the sight from blows and improves sighting conditions.

The sight safety is integral with the sight base. The top portion of the safety is open to permit installing the front sight by means of the key.

4. BOLT

The bolt (fig. 23) serves to push the rounds into the chamber, seal the bore and extract the cartridges cases from the chamber.

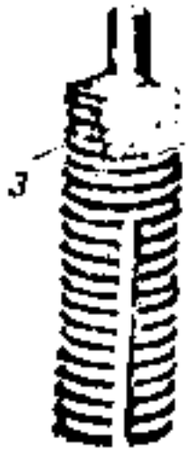

Figure 21. Front sight (1-32).

1 - threaded portion of sight; 2 - longitudinal groove; 3 - flat edges for key.

Figure 22. Front sight stud (1-31).

1 - threaded hole;
2 - alinement index.

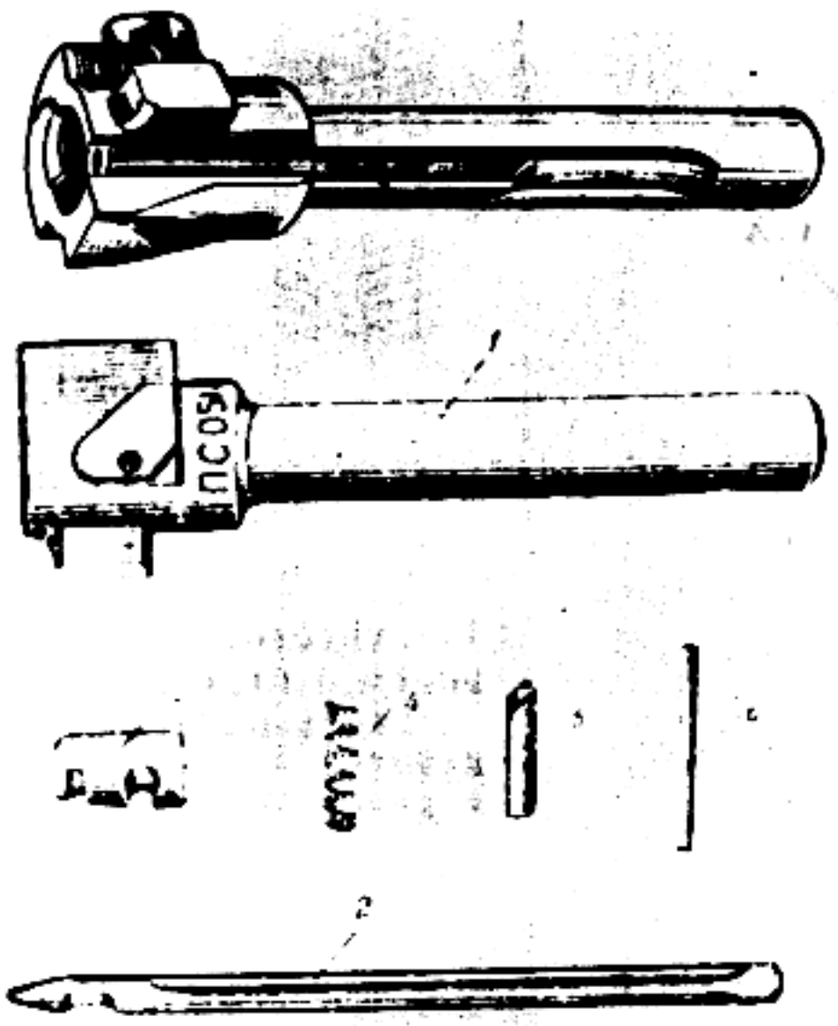

Figure 23. Bolt, assembled and disassembled (assy. (3-2).

1 - bolt body (3-4); 2 - firing pin (3-5); 3 - extractor (3-6); 4 - extractor spring (3-7); 5 - extractor pin (3-10); 6 - retaining pin (3-9).

The bolt consists of a body (1), firing pin (2), extractor (3) with spring (4) and pin (5), and pin (6).

The bolt body (fig. 24) serves to hold all the components of the bolt. The body consists of a bolt head, central cylindrical portion (2), and rear cylindrical portion (3).

The bolt head has a right (4) and left (5) lugs; guide lug (6); feed rib (7), the forward edge of which pushes out the rounds from the magazine feed block into the chamber; recess (8) for the extractor and spring; housing (9) for holding the cartridge case rim.

The bolt lugs engage the receiver lugs to seal the bore. The left lug (5) has a bevel, which together with the screw bevel of the cam (30) (see fig. 10) rotates the bolt a certain amount when the bore is about to be sealed. The lower edge (10) of the right lug together with the receiver cam limits rotation of the bolt to the right when the bore is being sealed.

The bolt is moved and rotated in sealing and opening the bore by means of the leading edge (6) of the bolt, which is guided by the walls of the groove in the operating rod.

The guide lug has a rear flat face (a), screw bevel (b), forward round face (c), and screw bevel (d).

The rear face (a) of the guide lug is guided by the variable groove of the operating rod when the latter is moving forward, thus causing the bolt to move forward until the bore starts to be sealed.

The screw bevel (b) of the guide lug is guided by the screw bevel of the variable groove in the operating rod, thus causing the bolt to rotate when the bore is being sealed.

The screw bevel (d) of the guide lug is guided by the screw bevel of the variable groove in the operating rod, thus causing the bolt to rotate when the bore is being opened.

The forward face (c) of the guide lug is guided by the forward wall of the variable groove in the operating rod when it is moving to the rear, thus causing the bolt to move to the rear after the bore is opened.

The left edge (e) of the guide lug, together with the straight wall of the variable groove in the operating rod, keeps the bolt from rotating to the left when the bore is sealed.

In addition, in the bolt head there is a hole (11) for the extractor pin and a hole (12) for the firing pin retaining pin.

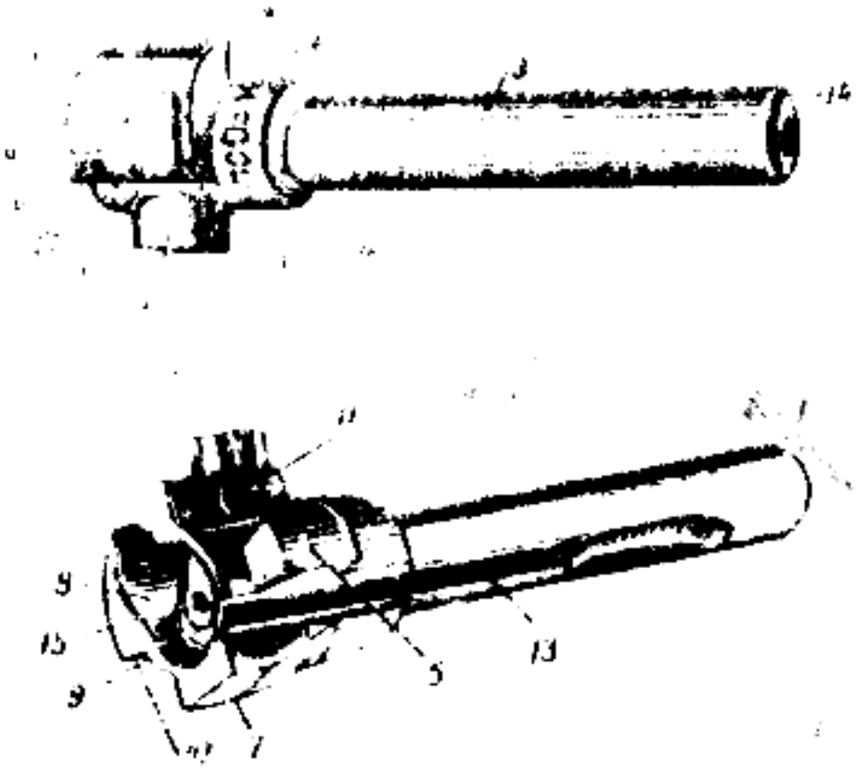

Figure 24. Bolt body (3-4).

1 - bolt head; 2 - central cylindrical portion; 3 - rear cylindrical portion; 4 - right lug; 5 - left lug; 6 - guide lug; 7 - feed lever; 8 - recess for extractor and spring; 9 - face; 10 - lower edge of right lug; 11 - hole for extractor pin; 12 - hole for retaining pin; 13 - longitudinal groove for extractor; 14 - channel for firing pin; 15 - hole for passing tip of firing pin; a - rear flat face of guide lug; b - screw bevel of guide lug; c - forward face of guide lug; d - screw bevel of guide lug; e - left edge.

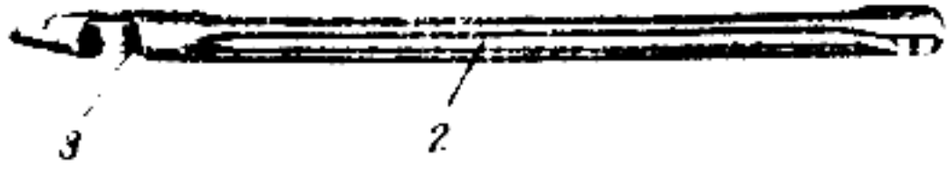

Figure 25. Firing pin (3-5).

1 - tip of firing pin; 2 - longitudinal grooves for decreasing weight of firing pin and decreasing friction between firing pin and bolt body; 3 - notch for retaining

The hole for the extractor pin has a smaller diameter at the bottom than the diameter of the pin, thus forming a circular shoulder in the hole.

In the body there is a longitudinal groove (13) for passing the extractor; in the rear portion, the groove is made wider for passing the extractor when the bolt is rotating as the bore is being sealed or opened.

In the center of the body there is a channel (14) for housing the firing pin. In the forward portion the channel is conical in shape, and the other end terminates in a hole (15) for passing the tip of the firing pin.

The firing pin (fig. 25), together with the hammer, pierces the primer of the round.

The firing pin is divided into the rear and the forward portion. The forward portion terminates in the tip of the firing pin (1); in the rear portion there are three longitudinal grooves (2) for decreasing the weight of the firing pin and for decreasing friction as it moves in the channel in the bolt body.

The firing pin is prevented from falling out of the body by pin (6) (fig. 23), by means of the notch (3) in the firing pin.

The extractor (fig. 26) with spring (2) removes the cartridge case from the chamber and holds it in the bolt housing until it meets the ejector.

The extractor has a flange (1a) for grasping the cartridge case rim, a recess (1b) for extractor spring, and a recess (1c) for extractor pin.

The extractor with spring is installed in the bolt head by means of pin (3). The extractor pin is prevented from falling out of its hole by pin (6) (see fig. 23) and the shoulder in the hole for the pin.

5. OPERATING ROD

The operating rod (fig. 27) actuates the bolt.

To the operating rod are attached rod (1) with piston (2).

Rod (1) is integral with the piston; the rod is connected with the operating rod by means of threads (3) and pin (4), which is installed in hole (5) in the rod and the forward end of the operating rod.

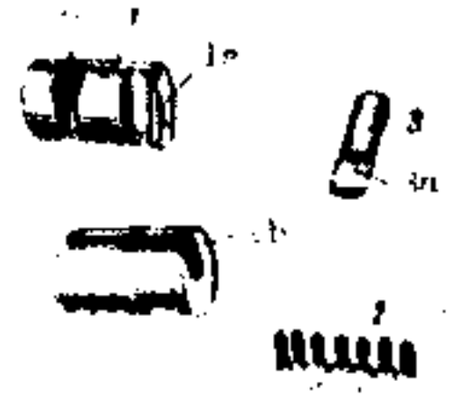

Figure 26. Extractor (3-6) with spring and pin.

1 - extractor (3-6); 1a - flange for grasping cartridge case rim; 1b - recess for extractor spring; 1c - recess for extractor pin; 2 - extractor spring (3-7); 3 - extractor pin (3-10); 3a - notch in extractor pin.

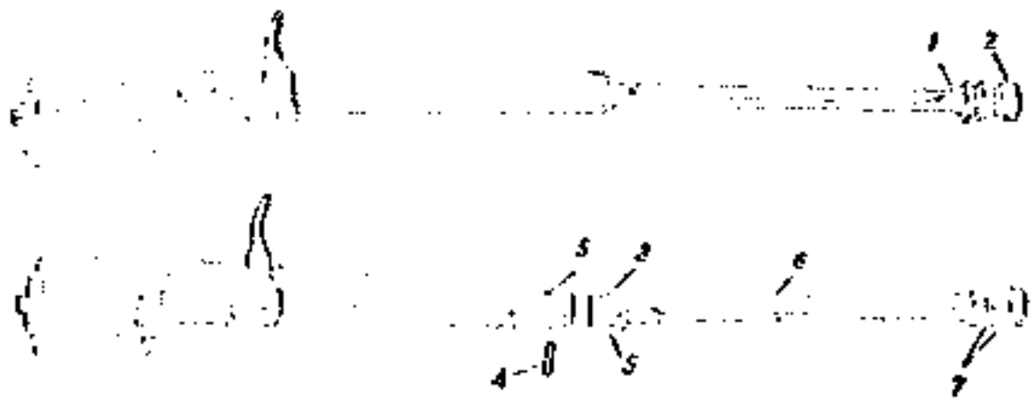

Figure 27. Operating rod, assembled and disassembled.

1 - rod (3-2); 2 - piston; 3 - threads for connection with operating rod; 4 - pin for connection of rod and gas piston rod (3-3); 5 - hole for pin; 6 - grooves; 7 - grooves.

In the rod there are four grooves (6) for decreasing its weight.

Piston (2) receives the pressure of the gases in the gas cylinder and transmits the pressure, through the gas piston rod to the operating rod.

In the piston there are grooves (7) for decreasing the escape of gases between the piston and the walls of the gas cylinder.

On the forward face of the piston there is a sharp rim which scrapes off carbon from the walls of the gas cylinder as the operating rod moves.

The operating rod (fig. 28) has a lug in the rear portion with cylindrical channel (8) in which the rear end of the bolt is installed. In the sides of the lug there are grooves (9) which guide the operating rod in the receiver.

On the right side of the lug there is a lug (10) which disconnects the full automatic sear, and is called the full automatic disconnector.

On the left side the lug has a notch (11) for passing the ejector, a rear bevel (12) for smooth cocking of the hammer when the operating rod is moving to the rear, and a forward bevel (13) for depressing the cocked hammer as the operating rod is moving forward.

On the right side of the operating rod there is a cocking handle (14).

On the rear face of the operating rod there is a cam (15) for cocking the hammer when the operating rod starts to move to the rear.

In the central portion of the operating rod there is a cam surface (16) on which the bolt guide rides. The bolt is made to move by means of this groove, and also to rotate in opening and closing the breech.

The cam has two screw bevels (a and b) which engage with the corresponding screw bevels of the bolt guide (see fig. 24) in opening and closing the breech.

The forward portion of the cam surface is wider since it contains the bolt guide when the operating rod is in motion in opening and closing the breech. Before the breech is completely sealed, the rear perpendicular wall (c) guides the rear flat face of the bolt guide, as a result of which the bolt moves forward

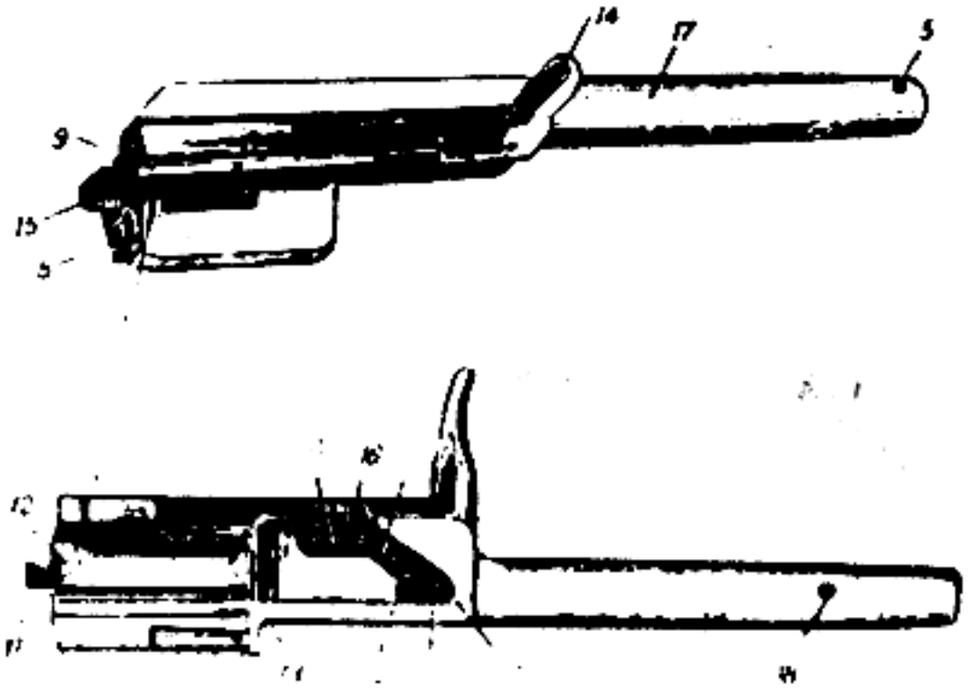

Figure 28. Operating rod (3-1).

A. Right view; B. Bottom view.

5 - hole for pin; 8 - cylindrical channel for rear end of bolt; 9 - right groove; 10 - lug, which is called the automatic trigger disconnector; 11 - notch for ejector; 12 - rear bevel of lug; 13 - upper bevel of lug; 14 - cocking handle; 15 - cam or cocking hammer; 16 - cam surface; 17 - cylindrical portion of operating rod; 18 - hole for releasing air and excess oil; a - screw bevel; b - screw bevel; c - rear perpendicular wall; d - cam surface forward round wall; e - longitudinal wall.

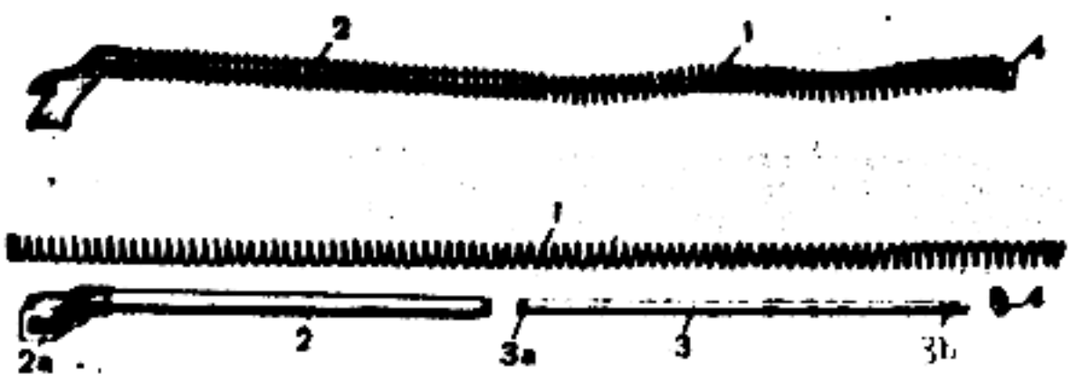

Figure 29. Return mechanism, assembled and disassembled (assy. 4).

1 - return spring (4-3); 2 - guide (4-1); 2a - connecting lug; 3 - guide rod (4-2); 3a - guide rod shoulder; 3b - washer notches; 4 - washer

together with the operating rod, thus excluding the possibility of its rotation before the breech is sealed. After the breech is opened, the cam surface forward round wall (d) guides the forward round face of the bolt guide, thus causing the bolt and the operating rod to move to the rear.

When the breech is closed, the left edge of the bolt guide presses against the left wall (e) of the cam, thus preventing the bolt from rotating to the left.

On the right the cam surface is cut to pass the bolt guide when the bolt is being separated from the operating rod or connected to the rod.

In the cylindrical portion (17) of the operating rod there is a channel which contains the return mechanism; interior threads for receiving the rod; hole (5) for the pin; and hole (18) for releasing air and excess oil when the operating rod is in motion.

6. RETURN MECHANISM

The return mechanism (fig. 29) consists of the return spring (1), guide (2), guide rod (3) and washer (4).

The return spring returns the operating rod and bolt to the extreme forward position after firing.

The guide (2) and guide rod (3) prevent the return spring from bending, and also make assembly and disassembly of the rifle more convenient.

On the inside of the forward portion of the guide there is a shoulder which stops the guide rod, and at the rear end there is a connecting lug (2a) for connecting the return mechanism to the receiver.

The guide rod is provided with a shoulder (3a), which engages with the shoulder of the guide, thus limiting motion of the guide rod; in the forward portion there are washer notches (3b).

The connecting lug (fig. 30) acts as a catch for the receiver cover.

The connecting lug has a shoulder (1) which retains the rear end of the return spring; guide lugs (2) for holding the connecting lug in the receiver grooves; lug (3) for holding the receiver cover; recess (4) for lug (15) (see fig. 28) of the operating rod as it moves to the extreme rear position. In the guide there is a channel (5) for guiding the guide rod.

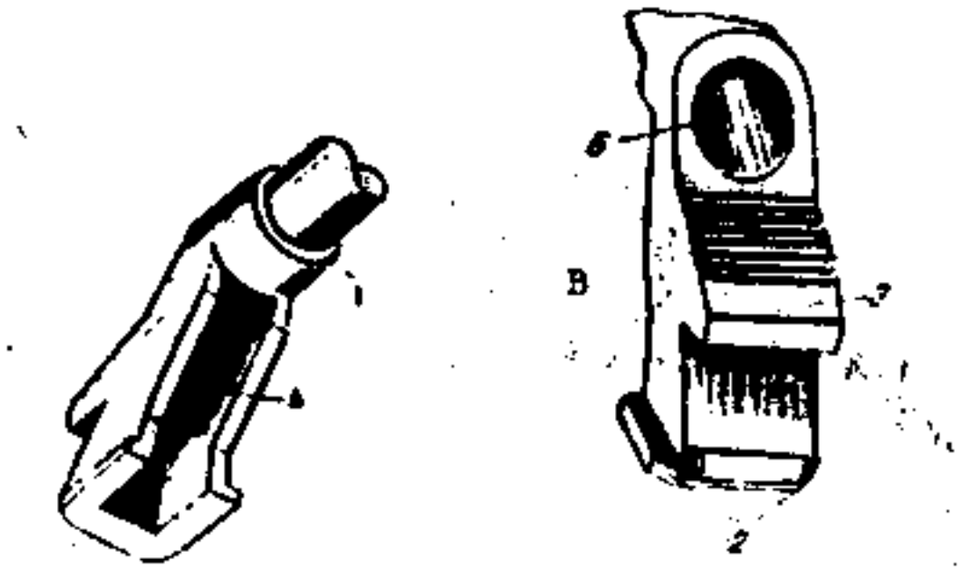

Figure 30. Connecting lug.

A. Front view; B. Rear view.

1 - shoulder for stopping return spring; 2 - guide lugs for holding receiver lug; 3 - lug for holding receiver cover; 4 - recess for operating rod lug; 5 - channel for guide rod.

Figure 31. Washer (4-4).

1 - flange; 2 - cut; 3 - recess.

Washer (fig. 31) serves as a stop for the return spring. It has a flange (1) which stops the forward edge of the return spring; cut (2) for mounting the washer on the guide rod; and recess (3) for the forward edge of the guide rod.

When the operating rod moves to the rear, the return spring compresses between the washer and the shoulder on the guide lug.

7. FIRING AND TRIGGER MECHANISM

The firing and trigger mechanism (fig. 32) serves to release the hammer from the semiautomatic sear and, together with the bolt, serves to fire the round. It permits of firing semiautomatic and full automatic fire.

The firing and trigger mechanism is housed inside the receiver and consists of a hammer (1), hammer and trigger spring (2), trigger (3), disconnector (4), disconnector spring (5), full automatic sear (6), full automatic sear spring (7), and selector (8) with lever.

The hammer (fig. 33) serves to strike the firing pin; it has a head (1) the flat portions (1a and 1b) of which serve as the cock notch (1a) and disconnector notch (1b). The head is rounded in the lower portion to obtain smooth action on the sear and on the disconnector.

In the lower portion of the hammer is the full automatic sear notch (2); tubular base (3) on which the hammer and trigger spring is mounted.

In the central portion there is a connection (4) for the spring.

The hammer is fastened in the receiver by means of a pin which passes through the tubular base.

The hammer and trigger spring (fig. 34) serves to impart energy to the hammer for the purpose of piercing the primer of the round. In addition, it actuates the trigger.

The hammer and trigger spring is made of 3-strand cable. It has a spring loop (1) which grasps the hammer body; two ends (2) with bent ends (2a) which press against the rear shoulders of the trigger. The hammer and trigger spring is mounted on the tubular base of the hammer.

The trigger (fig. 35) serves to actuate the parts of the firing and trigger mechanism. It has a sear (1) which serves as a stop for the hammer, both for semiautomatic and full automatic fire; hole (2) for the pin; bars (3) which are acted on by the ends of the spring; recess (3a) for the base of the disconnector; and trigger (4).

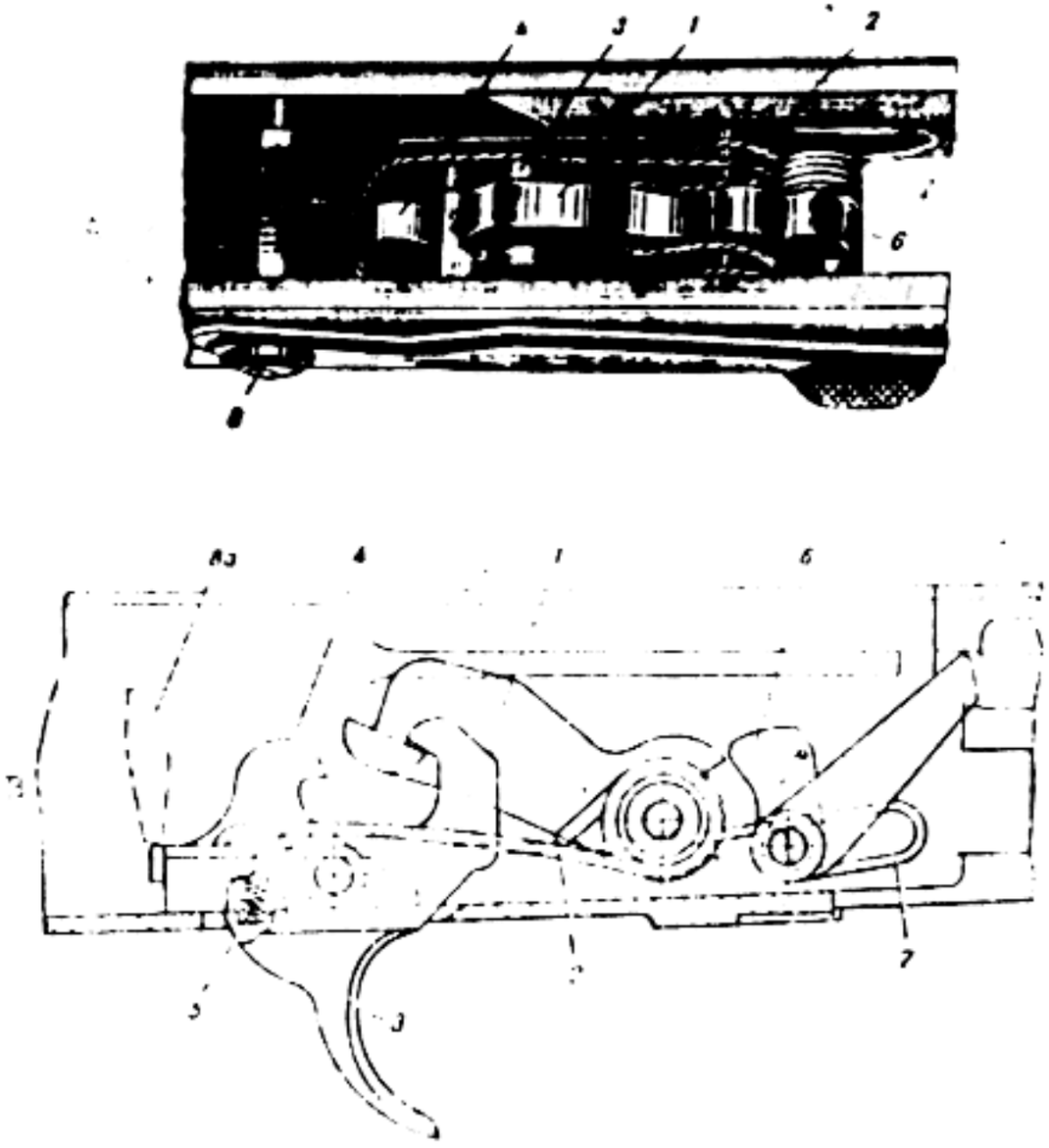

Figure 32. Firing and trigger mechanism.

A. Assembled; B. Sectional view.

1 - hammer (0-2); 2 - hammer and trigger spring (0-3); 3 - trigger (0-8); 4 - disconnector (0-9); 5 - disconnector spring; 6 - full automatic sear; 7 - full automatic spring (0-6); 8 - selector (assy. 1-3); 8a - selector lever.

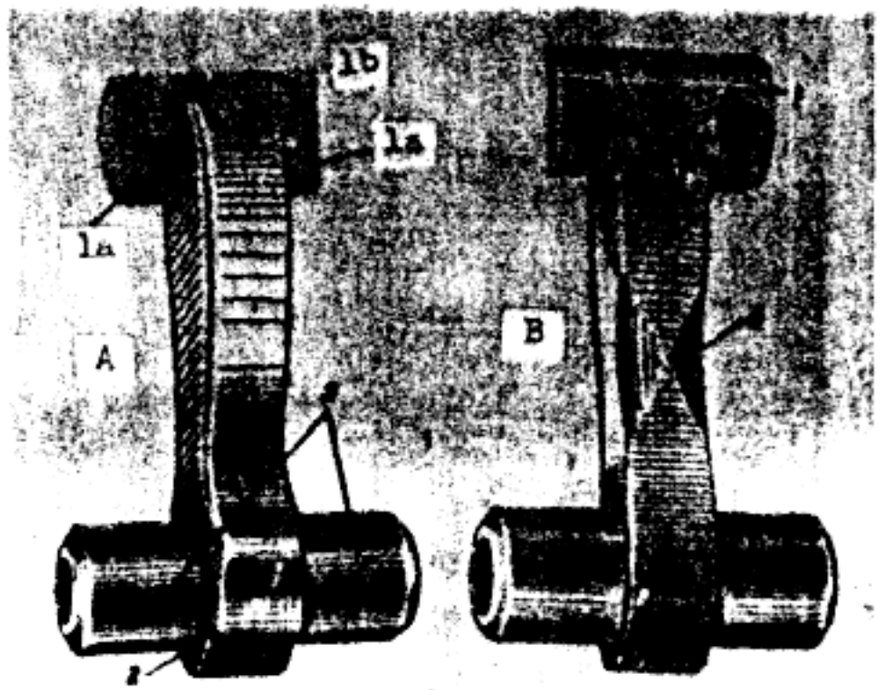

Figure 33. Hammer (0-2).

A. Front view; B. Rear view.

1 - head; 1a - cock notch; 1b - disconnector notch; 2 - full automatic sear notch; 3 - tubular base; 4 - connection for spring.

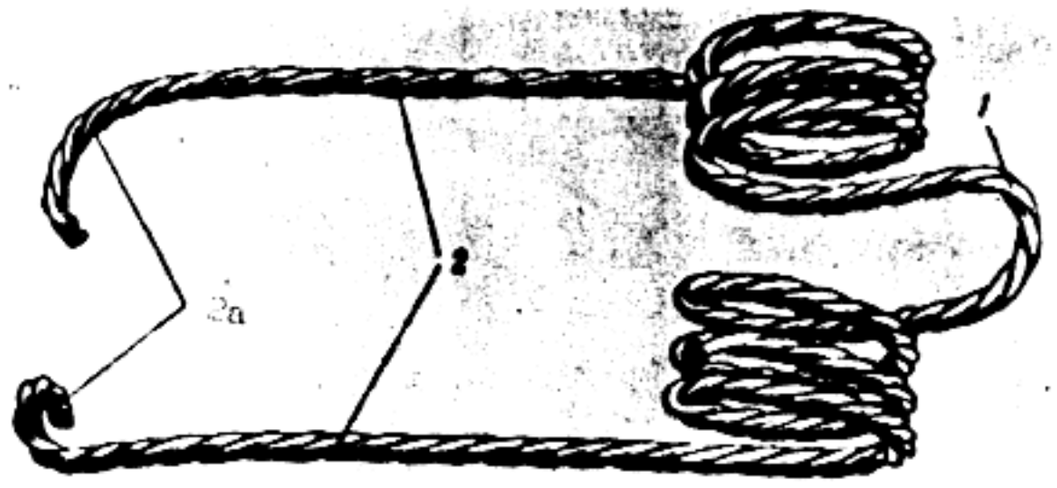

Figure 34. Hammer and trigger spring (0-3).

1 - spring loop; 2 - spring ends; 2a - bent ends.

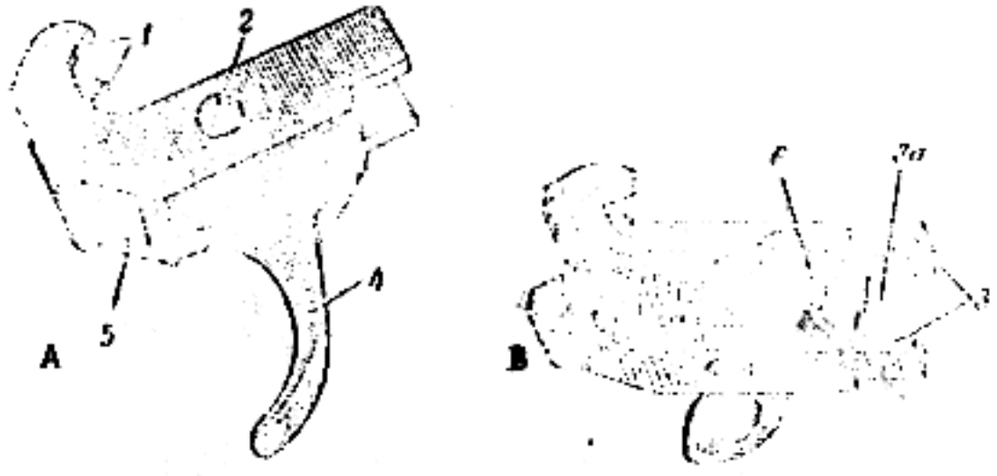

Figure 35. Trigger (0-8).

A. Left view; B. Top view

1 - semiautomatic sear; 2 - hole for pin; 3 - bars; 3a - recess for base of disconnector; 4 - trigger; 5 - recess for disconnector; 6 - recess for disconnector spring.

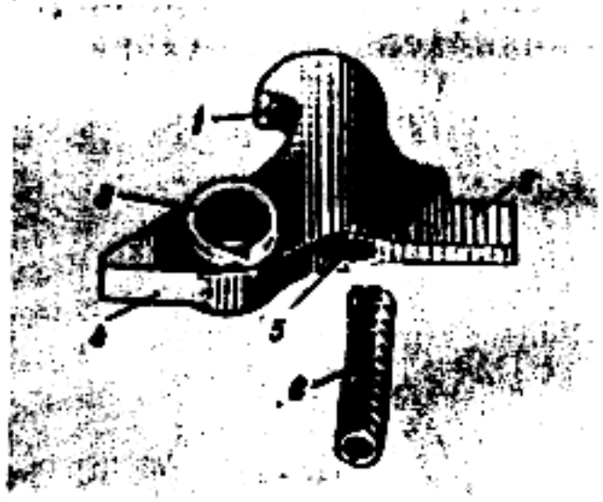

Figure 36. Disconnector (0-9).

1 - cam; 2 - lug; 3 - hole for pin; 4 - stop; 5 - recess for spring; 6 - disconnector spring (0-10).

In the trigger there is a recess (5) for the disconnector spring; in the base of the recess there is a recess (6) for the disconnector spring. The ends of the hammer and trigger spring serve as the trigger spring. The trigger is installed in the receiver by means of a pin.

The disconnector (fig. 36) holds the hammer at full cock in semiautomatic fire if the trigger is not released.

It has a cam (1), lug (2), hole (3) for pin, stop (4), the lower surface of which presses against the base of the groove in the trigger and does not permit the sear to rotate to the front, and recess (5) for disconnector spring (6).

The disconnector is installed on the same pin as the trigger.

The full automatic sear (fig. 37) serves to hold the hammer at full cock in full automatic fire, and prevents firing when the breech is not completely closed in both semiautomatic and full automatic fire.

The full automatic sear is provided with a lever (1) on the upper end of which acts the full automatic sear disconnector (see fig. 28) when the operating rod is moving to the extreme forward position; the full automatic sear (2); hole (3) for pin; hole (2a) for connecting the short end of the full automatic sear spring.

The full automatic sear is installed in the receiver on a pin. The full automatic sear spring (4) is mounted on the full automatic sear pin and attached to the full automatic sear by means of the short end (4a) which is inserted into hole (2a); the long end (4b) functions as a stop of the pins of the hammer, trigger and full automatic sear, and is installed in recesses of these pins.

Under the action of its spring, the full automatic sear has a constant tendency to rotate to the rear and retain the hammer on the full automatic sear by means of its sear.

The pins (fig. 38) of the hammer, trigger and full automatic sear are identical.

On the left ends of the pins there are shoulders (1) by means of which they press against the left wall of the receiver; grooves (2) in which the long (stop) end of the full automatic sear spring is located; the latter prevents the pins from falling out of their holes in the receiver.

The selector (fig. 39) is used for changing over the firing and trigger mechanism from semiautomatic

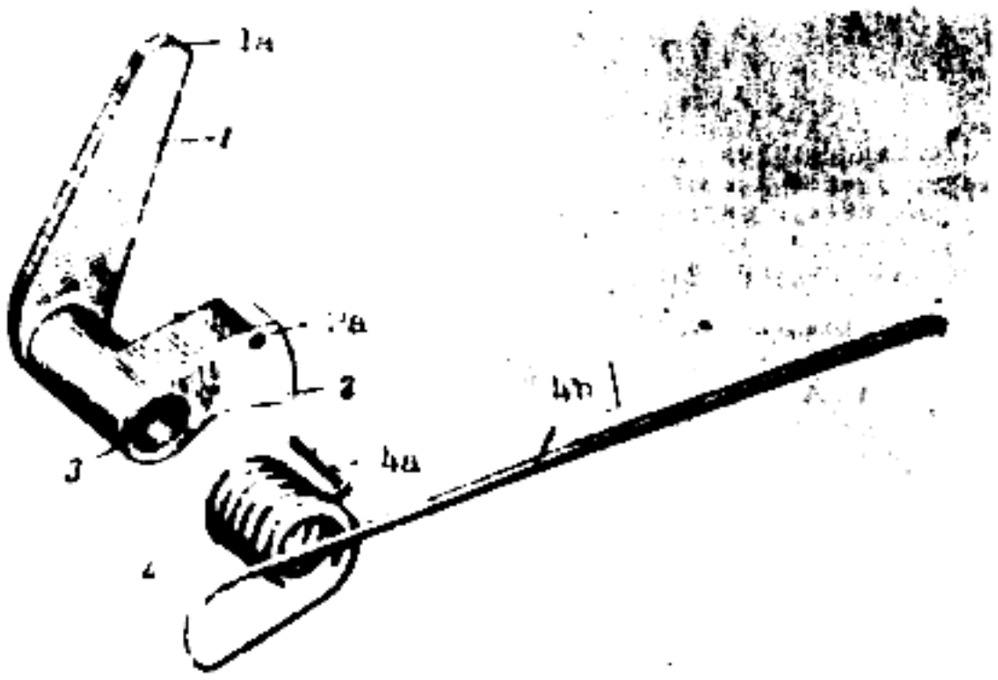

Figure 37. Full automatic sear (0-5).

1 - lever for rotating sear forward; 1a - upper end of sear; 2 - sear; 2a - hole for connecting short end of spring; 3 - hole for pin; 4 - full automatic sear spring (0-6); 4a - short end of spring; 4b - long (stop) end of spring.

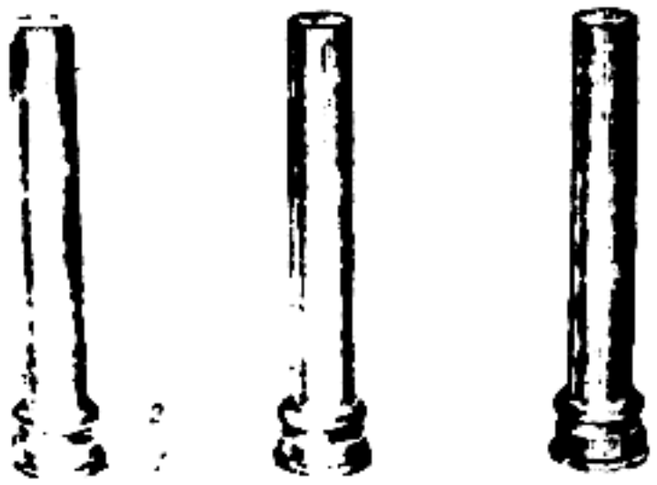

Figure 38. Trigger mechanism pins (0-25).

1 - shoulder; 2 - groove.

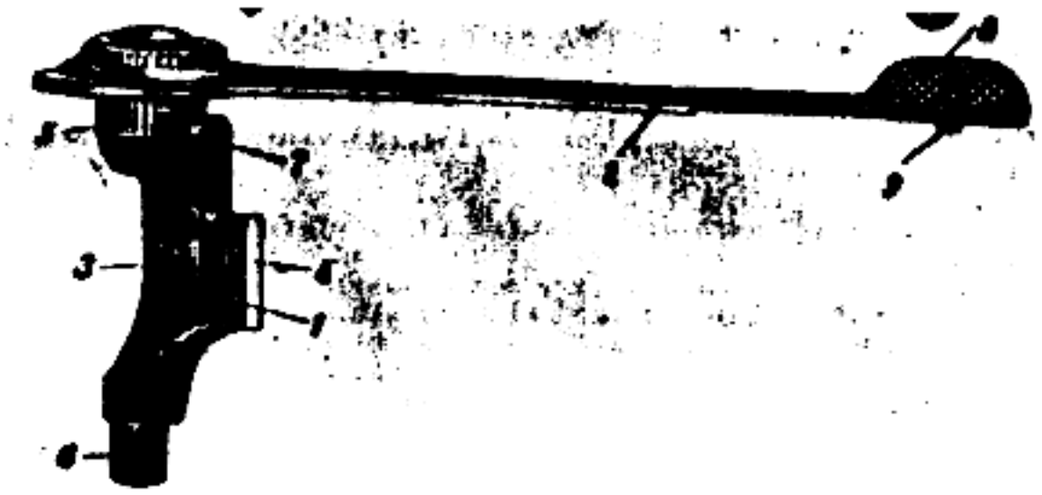

Figure 39. Selector (assy. 1-3).

1 - lever (1-13); 2 - indicator; 3 - recess for passing operating rod; 4 - lever lug; 5 - right pin; 6 - left pin; 7 - lever shoulder; 8 - grip for rotating indicator; 9 - lug.

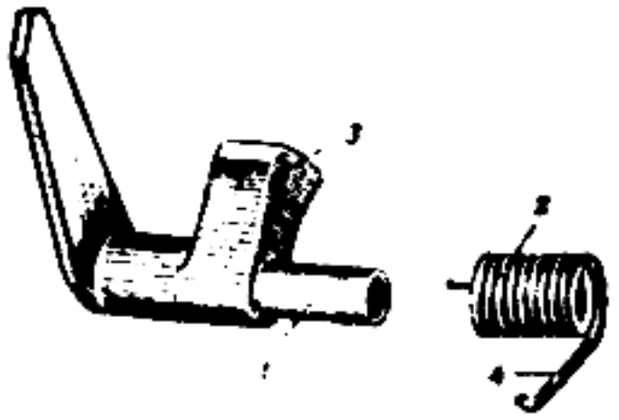

Figure 40. Full automatic sear with stamped receiver.

1 - tubular pin (0-5); 2 - full automatic sear spring (0-6); 3 - hole for short end of full automatic sear spring; 4 - long end of full automatic sear spring.

to full automatic fire, and for setting the safety. It consists of a lever (1) and indicator (2).

In the lever there are a recess (3) for passing the operating rod, a lever lug (4) which acts on the corresponding parts of the firing and trigger mechanism at various positions of the selector, right pin (5) which is placed in and rotates in the round parts of the variable hole in the right wall of the receiver (see fig. 9), left pin (6) which is located in the hole in the left wall of the receiver.

The selector is prevented from falling out of the receiver by shoulder (7) and indicator (2).

The indicator has a grip (8) for rotating the indicator, and a lug (9) for retaining the selector in the desired position.

When the selector is set for the desired type of fire, lug (9) enters the corresponding recess in the right wall of the receiver (see fig. 9).

The selector grip also serves to protect the opening for the cocking handle when the rifle is set on safety.

There are in use rifles with stamped receiver in which the firing and trigger mechanism is not disassembled. The ends of the pins of the hammer, trigger, and full automatic sear of these rifles are staked and held securely in the receiver.

The full automatic sear (fig. 40) of these rifles has a tubular pin (1) on the left end of which is installed the full automatic sear spring (2).

The short end of the full automatic sear spring is held in hole (3) and the long end (4) is held in a notch between the left wall of the receiver and the rear face of the receiver insert (fig. 41).

In rifles with stamped receiver, the selector (fig. 42) has a lever (1) with lug (1a). An indicator (2) is attached to the lever.

8. RECEIVER COVER

The receiver cover (fig. 43) closes the receiver and protects the parts of the rifle from dirt.

In the right wall of the receiver cover there is a step-shaped notch (ignition port) (1) which, together with the

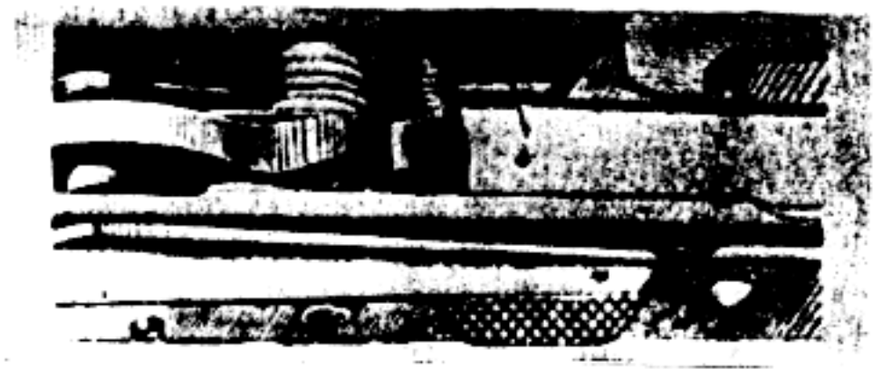

Figure 41. Fastening of long end of full automatic sear spring in rifle with stamped receiver.

4 - long end of full automatic sear spring.

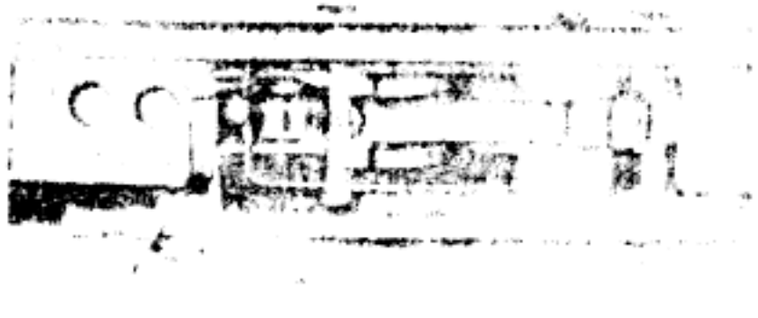

Figure 42. Selector of rifle with stamped receiver.

1 - lever; 1a - lug; 2 - indicator

Figure 43. Receiver cover (0-1).

1 - ejection port and port for cocking handle; 2 - notch for receiver lug; 3 - recess for lug on guide rear end (cover latch).

receiver, forms an opening for ejecting cartridge cases, and and opening for the cocking handle; in the left wall there is a notch (2) for the receiver lug; in the rear wall there is a recess (3) for the lug on the rear ends of the guides. The cover is fastened to the receiver by its forward face, which enters a semicircular groove in the base of the rear sight (see fig. 19), and by means of the lug of the guide rear end, which enters an opening in the rear wall of the receiver cover.

9. GAS TUBE AND HAND GUARD

The gas tube (1) (fig. 44) guides the piston and holds the hand guard. In the forward portion of the gas tube, there are eight holes (1b) (four on each side) for passing gases; in the central portion there are corrugations (1a) which decrease friction of the piston as it moves in the gas tube. The rear end of the gas tube has a cylindrical shape, and the forward end of the operating rod moves in it.

On the gas tube are fastened the forward (3) and rear (4) bands of the hand guard with flanges (3a and 4a), which hold the hand guard.

The hand guard (2) protects the hands of the rifleman from burns in prolonged firing and provides more convenience in operating the rifle. In the bottom portion of the hand guard there are four recesses (2a) (two on each side) for air circulation. The hand guard is attached to the gas tube by means of bands (3 and 4).

The gas tube with hand guard is installed on the barrel with its forward end on the gas cylinder and its rear end in notch (6) (see fig. 19) of the rear sight base by means of the gas tube lock.

10. PISTOL GRIP

The pistol grip (fig. 45) provides more convenience in directing the fire. It has a cap (1) for protecting the pistol grip against splitting, recess (2) for the base of the pistol grip, groove (3) for trigger guard, a recess for the screw washer, and a channel on the inside for passing the pistol grip screw.

The pistol grip is attached to its base by means of screw (4) which is threaded into the base. There are also rifles with stamped receiver in use (fig. 46); in these models, the pistol grip consists of two stocks (1 and 2). The stocks are fastened to pistol grip (5) by means of screw (3) with nut (4).

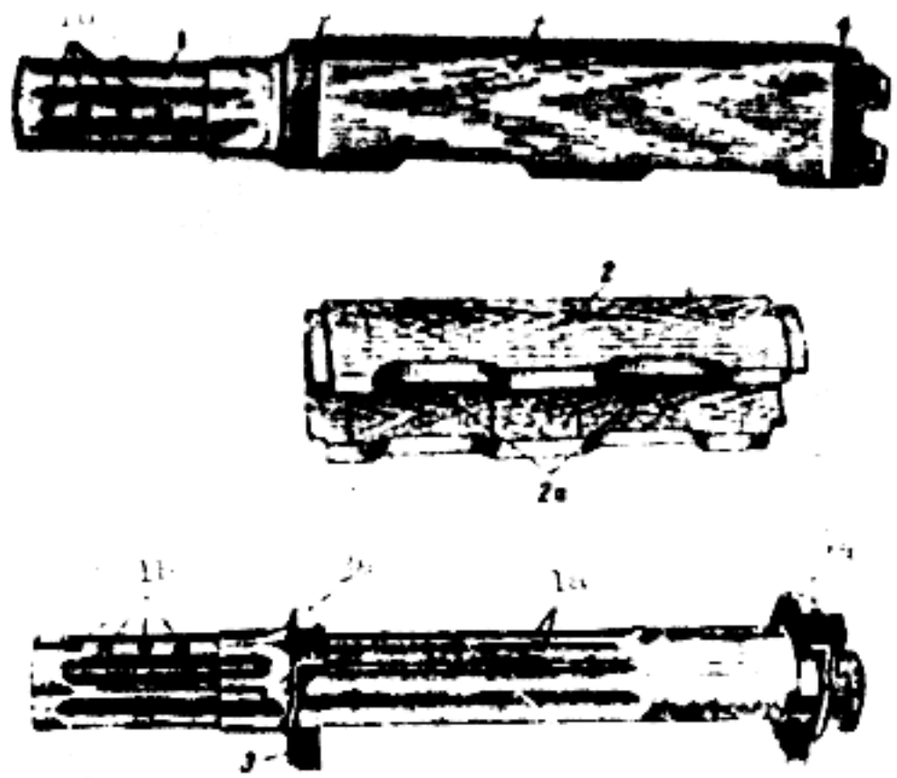

Figure 44. Gas tube with hand guard, assembled and disassembled (assy. 1-12).

1 - gas tube (assy. 1-2); 1a - corrugations; 1b - holes for passing gases; 2 - hand guard (1-40); 2a - recesses; 3 - forward band; 3a - flange; 4 - rear band; 4a - flange.

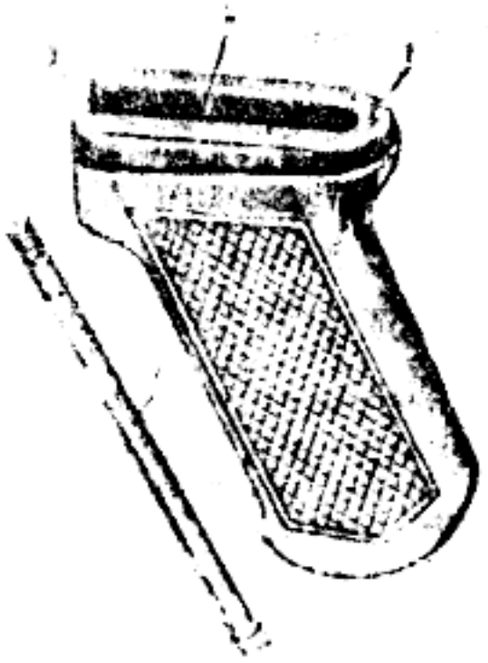

Figure 45. Pistol grip (assy. 8).

1 - cap for protecting the grip against splitting (8-2); 2 - recess for base of grip; 3 - groove for trigger guard; 4 - screw (0-19).

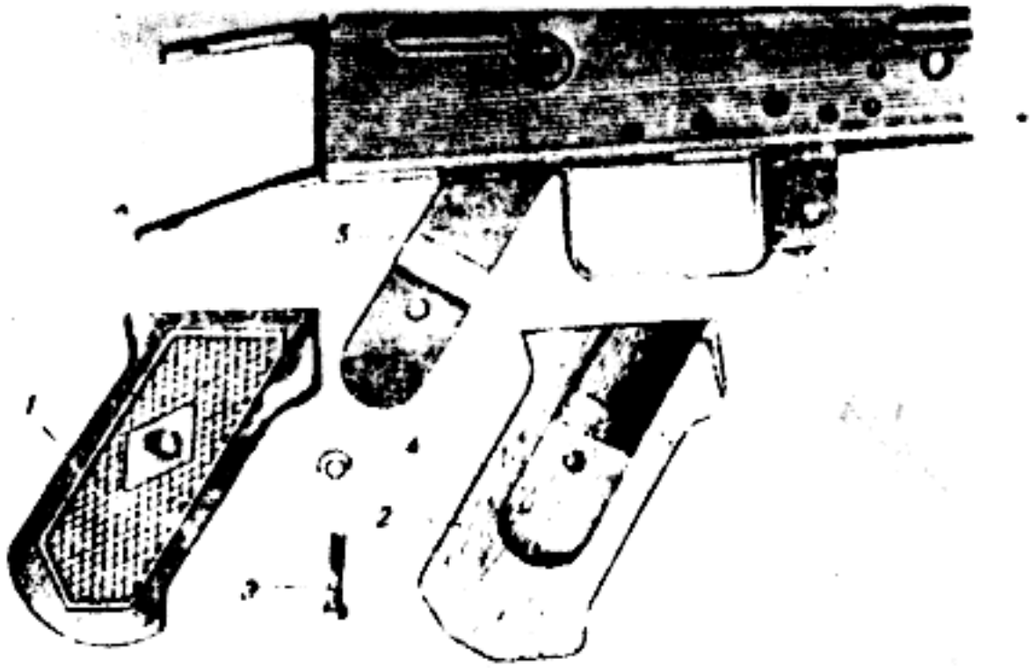

Figure 46. Pistol grip of rifle with stamped receiver.

1 - right stock (0-17); 2 - left stock (0-18); 3 - screw (0-19); 4 - nut (0-20); 5 - base of pistol grip.

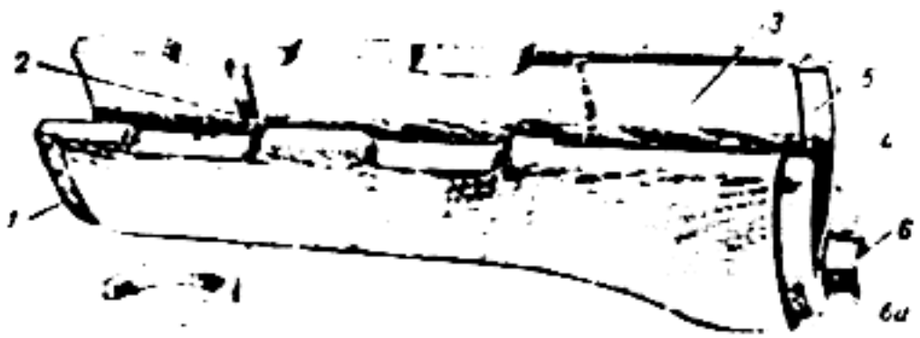

Figure 47. Fore end (assy.6).

1 - band shoulder; 2 - notch for clamp; 3 - recess for base of sight; 4 - clamp (6-12); 5 - notch for barrel shoulder; 6 - lug for holding fore end in receiver; 6a - lugs for holding clamp in fore end; 7 - clamp (0-15).

11. FORE END

The fore end (fig. 47) makes handling of the rifle more convenient and protects the hands of the rifleman from burns during intensive firing. It has a shoulder (1) for the band, notch (2) for clamp (7), recess (3) for the rear sight base lug, clamp (4) for protecting the fore end from splitting, notch (5) for the barrel lug, lug (6) for attaching the fore end to the receiver. In the fore end there is a channel for passing the cleaning rod.

The clamp is retained on the fore end by means of two lugs (6a). In the top of the fore end there are four notches (two on each side) for air circulation.

Clamp (7) protects the fore end from warping and sticking to the barrel.

The fore end is attached to the barrel by means of a band which is mounted on the forward end of the fore end and a lug (6) which is placed in a recess below the receiver (see fig. 10).

12. BUTT

The butt (fig. 48) makes handling of the rifle more convenient. It has a clamp (1), a butt plate (2), and swivel (3).

In the butt (fig. 49) there is a recess for the accessories case and case spring (5) which holds the case in the butt and ejects the case when the plate is removed.

The butt is attached to the receiver by means of a clamp and pin.

The clamp (fig. 50) protects the butt from splitting and holds it to the receiver. The clamp has a recess (1) for the forward end of the butt, two lugs (2) with holes for screws, lug (3) with grooves for attaching the butt to the receiver. On the lug there is a groove (4) for the pin which holds the butt to the receiver. The clamp is attached to the butt by means of screws (5).

The butt plate (fig. 51) protects the butt from splitting. It has flanges (1) for grasping the face of the butt, hole (2) through which the accessory case is inserted, and holes (3) for screws (4).

The cover (5) closes the hole in the butt plate. It has a base (6) and spring (9).

Figure 48. Butt (assy. 5).

1 - clamp (5-13); 2 - butt plate (5-2); 3 - swivel (assy. 5-1).

Figure 49. Butt (assy. 5).

1 - clamp (5-13); 2 - butt plate (5-2); 3 - swivel (assy. 5-1); 4 - recess for case and case spring; 5 - case spring (5-5); 6 - cover base; 7 - butt plate cover pin; 8 - bent portions of cover; 9 - screws.

Figure 50. Clamp (5-13).

A. Right view; B - Left view.

1 - recess for forward end of butt; 2 - lugs with holes for screws; 3 - lug for attaching butt; 4 - groove; 5 - screws.

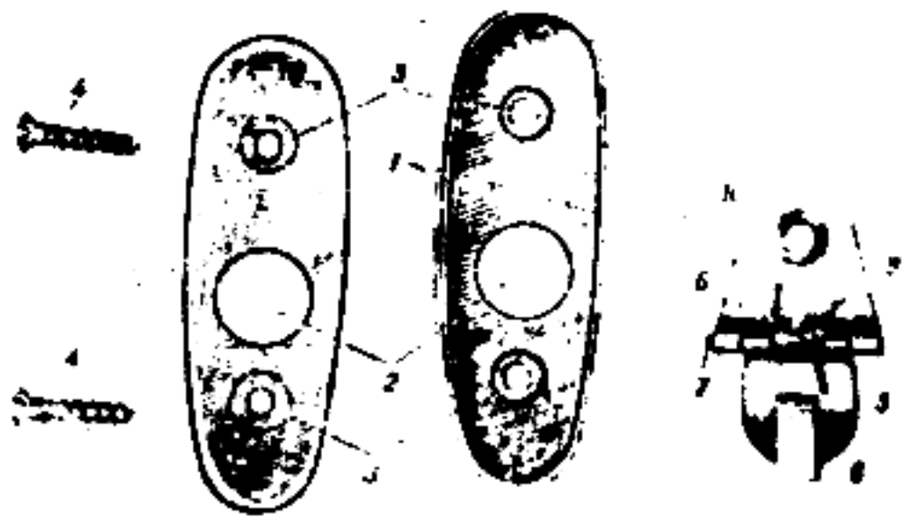

Figure 51. Butt plate (5-2) with cover.

1 - flanges; 2 - hole for passing case with accessories; 3 - holes for screws; 4 - screws; 5 - cover (5-8); 6 - cover base (5-9); 7 - cover pin (5-11); 8 - bend portion of cover; 9 - cover spring (5-10); 10 - hole for screw.

Figure 52. Swivel (assy. 5-1).

1 - ring (5-7); 2 - base (5-6); 3 - screws; 4 - holes for screws.

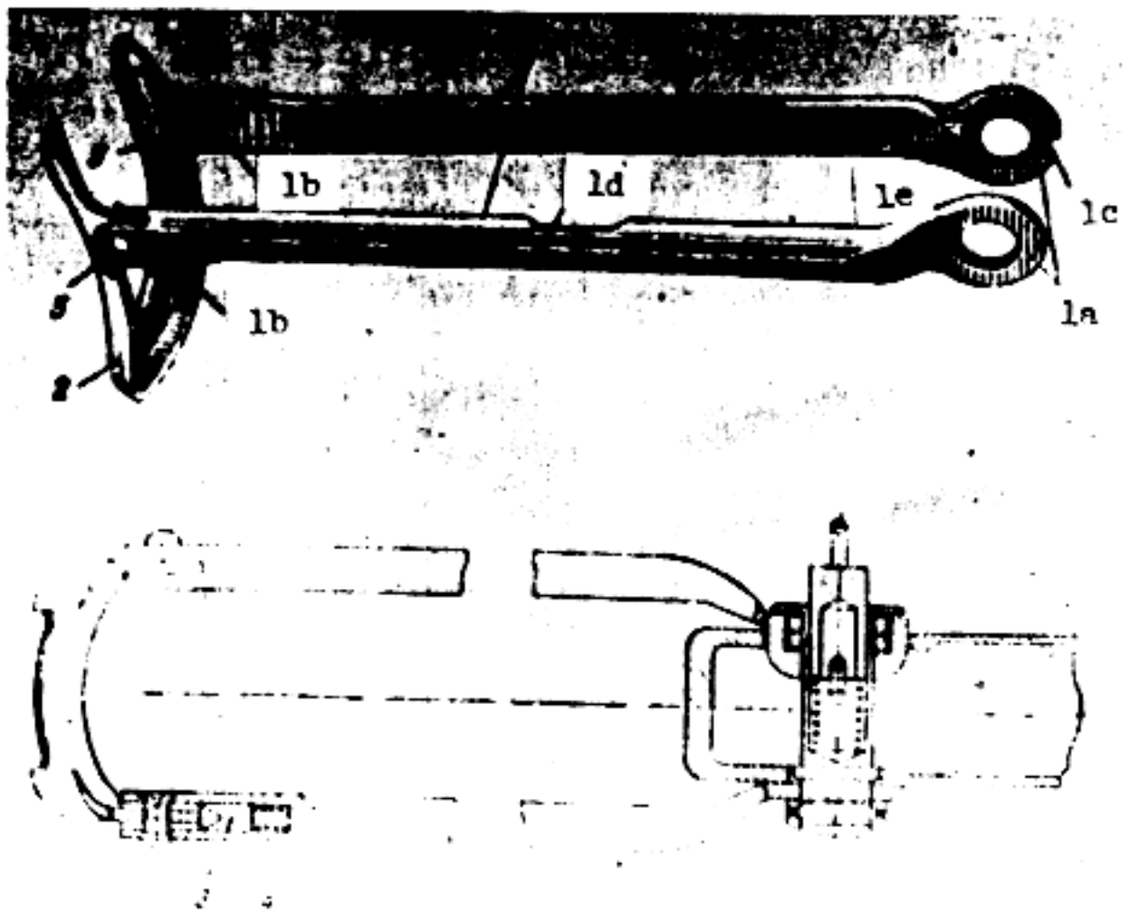

Figure 53. Folding metal stock. (General view and cross section)

1 - bars (1-50; 1-51); 1a - lugs for stock pin; 1b - lugs for shoulder rest; 1d - notch for passing selector indicator grip; 1e - hole for stock catch; 1f - notch for butt catch; 2 - shoulder rest (1-52); 3 - shoulder rest lock (1-53); 4 - shoulder rest lock spring (1-54); 5 - shoulder rest pins (1-55).

The cover has a bent portion (8) for compressing the accessory case into the recess when the cover is removed.

The cover and spring are attached to the cover base by means of pin (7). The cover base is attached to the butt plate by means of screw (4) which passes through the upper hole in the butt plate and hole (10) in the base.

The swivel (fig. 52) attaches the sling to the butt. It consists of a ring (1) and base (2). The base has two holes (4) for screws (3) which hold the swivel to the butt.

In automatic rifles with stamped receiver, the butt is attached directly to the receiver rear plate (see fig. 16) by means of two screws.

The folding metal stock (fig. 53) consists of two bars (1) and a shoulder rest (2).

On the forward ends of the bars there are lugs (1a) for the stock pin, and on the rear end there are lugs (1b) for the pins of the shoulder rest. In the rear ends of the bars there are locks (3) with springs (4) which retain the shoulder rest in the service position.

In the right bar there is a notch (1d) for passing the selector indicator grip when the stock is folded.

In the lug of the left bar there are a hole (1e) and semicircular notch (1f) for the stock catch.

The shoulder rest is attached to the bars by means of pins (5), the ends of which are flattened.

The stock catch (fig. 54) holds the stock in the service and folded positions.

The stock pin (1) holds the stock to the receiver. It has a rim (1a) which functions as a stop for the pin, oval-shaped hole (1b) for the catch pin, thread (1d) for the nut, and hole (1e) for the nut pin. The catch (2) has two lugs (2a) which enter the holes in the left wall of the receiver and lock the left bar of the stock in the service and folded position. The catch is mounted on the pin and fastened by means of a pin, which is inserted in hole (2b) and passes through the oval-shaped hole (1b).

Catch plunger (3) has a hole (3a) for the pin, by means of which it is connected to the catch.

The swivel (4) is attached on the stock pin. Nut (5) attaches the stock bars to the receiver. It has a hole (5a)

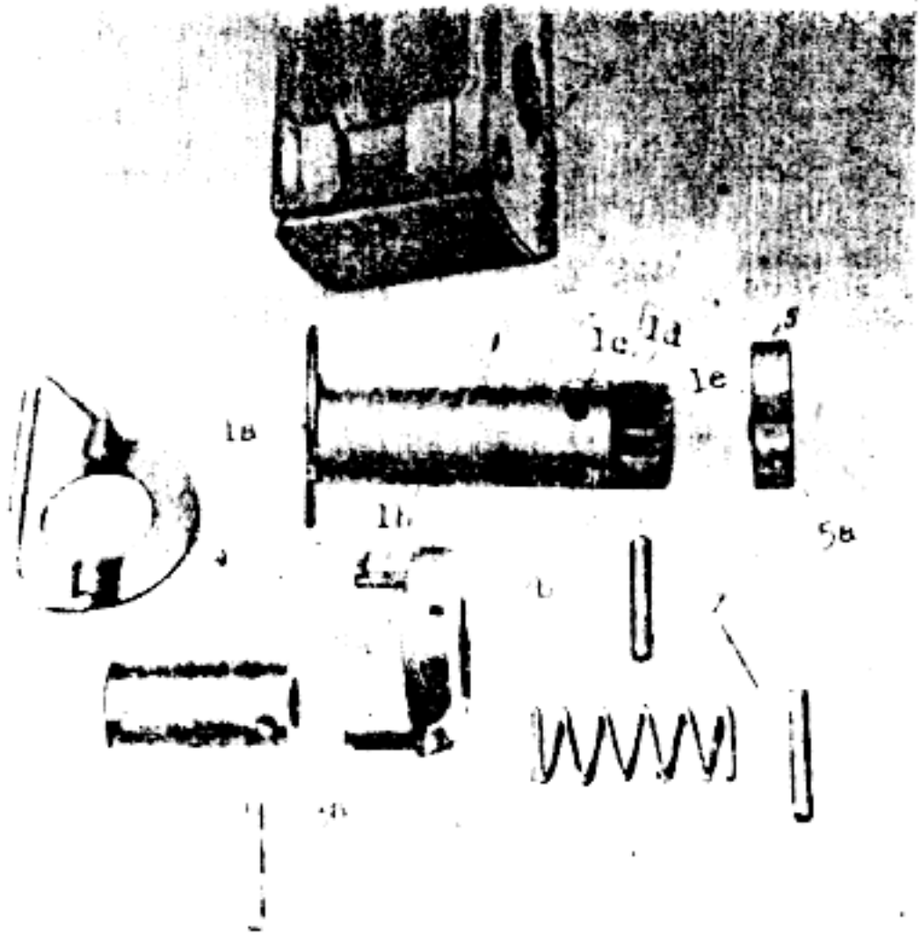

Figure 54. Stock catch.

1 - stock pin (1-56); 1a - rim; 1b - oval-shaped hole for catch pin; 1c - hole for stop pin; 1d - thread for nut; 1e - hole for pin; 2 - catch (1-58); 2a - catch lugs for locking left bar; 2b - hole for fastening catch on pin by means of set pin; 3 - catch plunger (1-57); 3a - hole for pin; 4 - swivel (assy. 1-10); 5 - nut for attaching stock bars to receiver (1-60); 5a - hole for pin; 6 - notch for stop pin; 7 - pins (1-6-1); 8 - catch spring.

for the pin. The stock pin is prevented from rotating in the receiver when the catch is open by means of a stock pin, the ends of which enter notches (6) in the right wall of the receiver when the stock is folded.

Catch spring (8) is located inside the stock pin and continually acts on the catch plunger, and by means of the latter, on the catch.

NOTE: In automatic rifles with stamped receiver of an earlier manufacture, the stock pin is flattened on the right and cannot be removed from the receiver.

13. MAGAZINE

The magazine (fig. 55) contains and feeds the rounds. It consists of a body (1), follower (2), follower spring (3), base plate (4) and base plate retainer (5).

The body serves to connect all the parts of the magazine and for holding thirty rounds.

The upper portion of the body acts as a feeding mechanism, and has flanges for retaining each round before it is fed into the chamber. Between the flanges there is a hole for passing the feeder arm, which pushes out each round from the feed mechanism as the bolt moves forward and sends the round into the chamber.

To the top of the magazine body are welded two side plates (1a), stop (1b), and bracket (1c) with catch (1d). The side plates serve to reinforce the upper portion of the magazine body and to position the magazine in the receiver properly.

Catch (1b) holds the forward portion of the magazine to the receiver; when the magazine is attached, the catch enters notch (27) of the receiver (see fig. 10). Section (1e) of the magazine body, together with lugs (28) of the receiver (see fig. 10), limit the upward movement of the magazine, and groove (1f) serves to pass the lower portion of the receiver cam.

Stock (1b) holds the rear portion of the magazine to the receiver; when the magazine is being attached to the receiver, the magazine catch is engaged by stop (1b), thus preventing the magazine from falling out.

In the lower portion of the magazine body there are flanges for attaching the cover plate. On the rear wall there is a hole through which the last round of a fully loaded magazine can be seen.

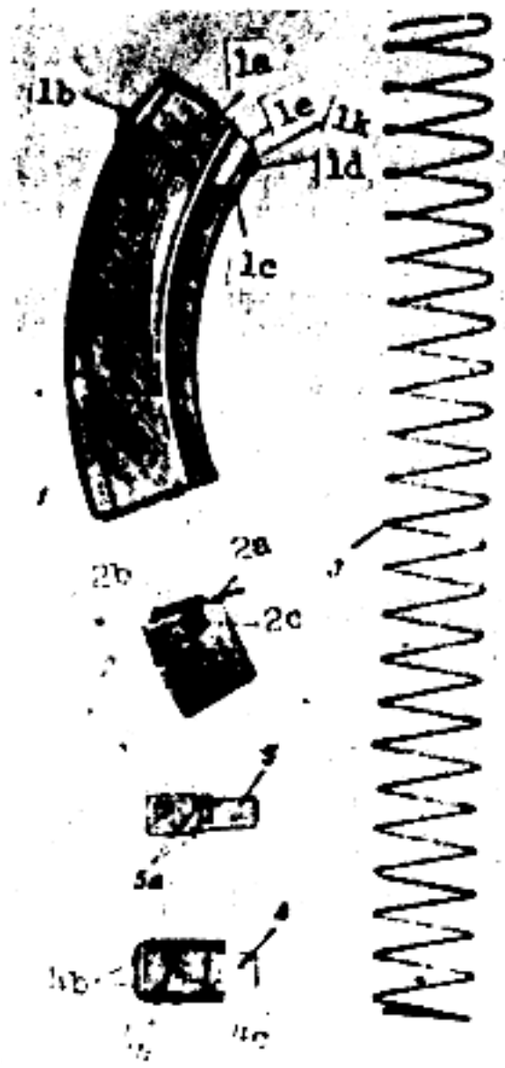

Figure 55. Magazine (assy. 7)

1 - body (assy. 7-1); 1a - magazine side plates (7-1; 7-2); 1b - stop; 1e - bracket (7-6); 1d - catch; 1e - section; 1f - groove; 2 - follower (assy. 7-2); 2a - feed surface; 2b-lug; 2c-lug for attaching spring; 3 - follower spring (7-9); 4 - magazine base plate (7-11); 4a - plate flanges; 4b - lugs; 4c - hole for stop lug; 5 - base plate retainer (7-1); 5a - catches.

The follower (2) transmits the force of the spring to the cartridges, and, together with the feed mechanism of the magazine, locates each round properly before it is fed into the chamber. It has side plates for guiding the follower, feed surface (2a), on which the round is located, and lug (2b) which locates the rounds in the magazine in a staggered double column. On the right plate, the follower has a lug (2c) for holding the follower spring.

The follower spring serves to feed the rounds into the feed mechanism by means of acting on the follower.

The magazine cover plate seals the magazine. It has flanges (4a) for connection with the magazine body, two lugs (4b) for limiting the motion of the cover plate when the magazine is being assembled, and hole (4c) for passing the base plate retainer lug.

The base plate retainer has a stop lug in the lower section for holding the cover on the body and two catches (5a) for connection with the follower spring.

14. SPARE PARTS AND ACCESSORIES

Each automatic rifle is issued with spare parts and accessories. Sets of spare parts and accessories for units are divided into individual and unit (repair) sets. The individual set includes the accessories (fig. 56) required for the automatic rifle in all conditions of service.

The accessories are designed for assembly and disassembly, cleaning and lubrication, preparation of the rifle for firing, and eliminating stoppages in fire.

The individual set of accessories includes the following items:

Cleaning rod (1) for cleaning and lubricating the bore, gas tube, interior channel of the operating rod, and for assembly and disassembly of the return mechanism. It has a head (1a) with a notch and hole, and threads (1b) for attaching the jag and wire brush (3). The cleaning rod is attached to the rifle underneath the barrel.

Jag (2) for cleaning and lubrication of the bore, gas tube, gas cylinder and channel in operating rod; it consists of a rod with threads for attaching to the cleaning rod, and a rod with notch.

Wire brush (3) for lubricating the bore; it has a rod with threaded channel for connection with the cleaning

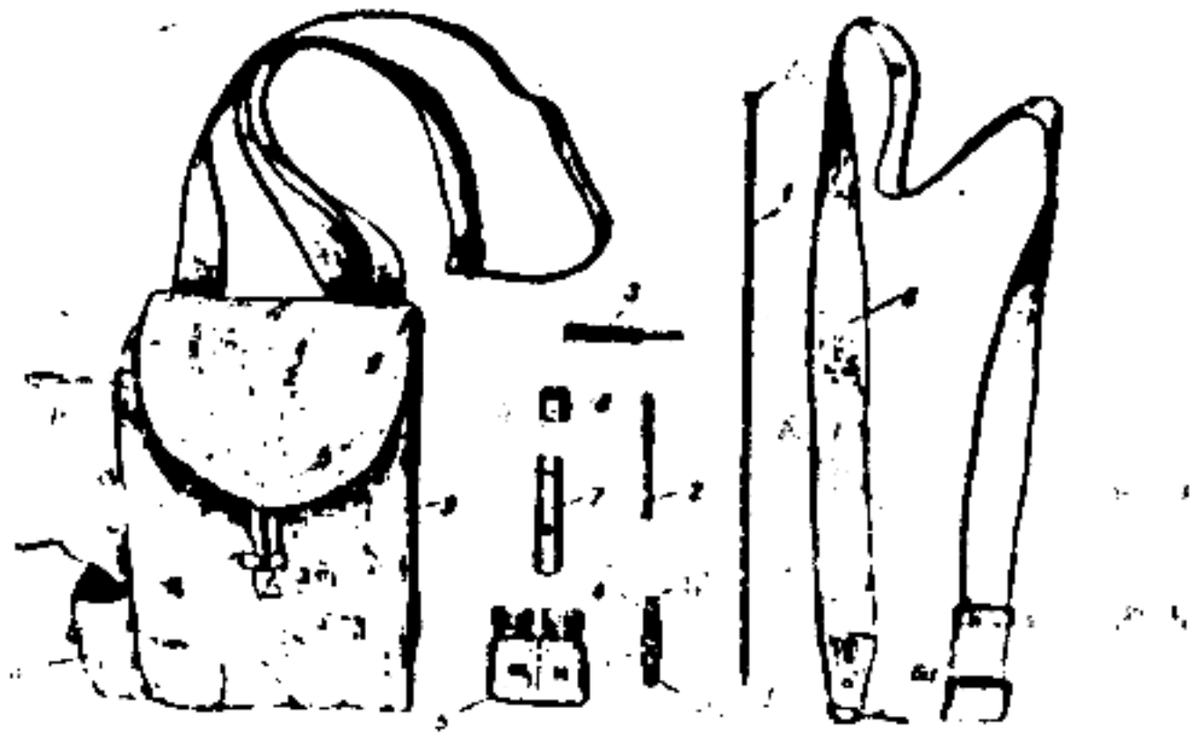

Figure 56. Accessories.

1 - cleaning rod (0-24); 1a - cleaning rod head; 1b - threads; 2 - jag; 3 - wire brush; 4 - combination tool (assy. 3); 4a - screw driver; 4b - key for front sight; 4c - key for jag; 5 - oil can; 6 - sling (assy. 5); 6a - snap (assy. 6); 7 - case (1); 8 - cap (assy. 2); 9 - bag for magazines; 9a - pocket for oil can; 9b - pocket for case.

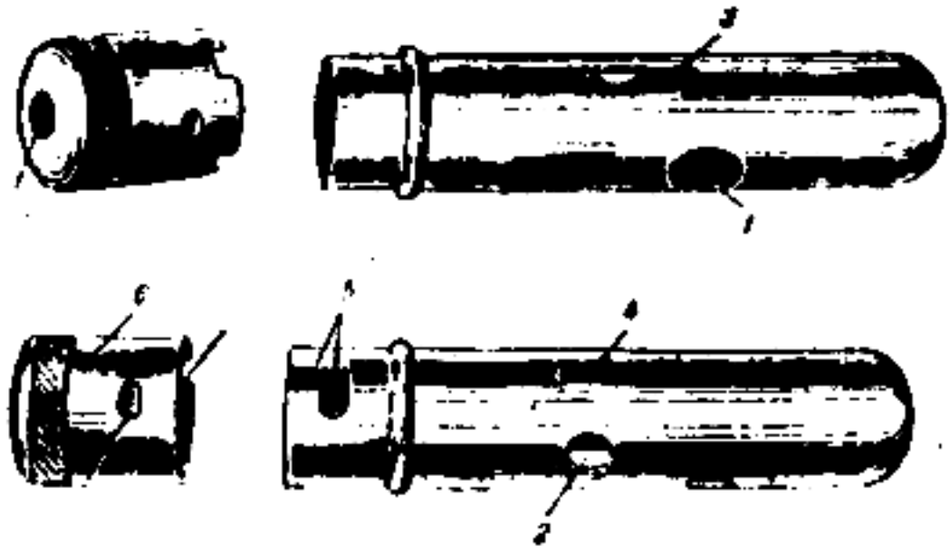

Figure 57. Accessories case.

1 - large hole; 2 - small hole; 3 - long slot; 4 - short slot; 5 - notches; 6 - cap; 6a - lugs; 6b - notches for lock; 6c - hole

rod, and a wire rod on which there are bristles for applying lubricant.

Combination tool (4) with knock-out rod. The screwdriver (4a) is used to tighten the screws in the butt, butt plate and sling swivel. The key at the end (4b) is used to screw and unscrew the front sight when zeroing the weapon. The key in the side (4c) is used to attach the jag to the cleaning rod. The knock-out rod is used in disassembly and assembly of the rifle and magazine.

Double can (5). Caustic solution is stored in the compartment marked Shch, and rifle oil in the compartment marked N*. The can is carried in a pocket in the magazine bag.

Sling (6). This is a shoulder sling used only for carrying the rifle. One end is provided with a hook which is attached to the upper swivel on the rifle.

The jag, wire brush and combination tool are stored in the accessories case (7), which is provided with an end cap (8).

Six magazines and a bag (9) with space for five magazines are issued with each rifle. The bag has two side pockets, one (9a) for the double can and one (9b) for the accessories case (which must be carried in this pocket when the rifle in use has a folding metal butt).

The accessories case (fig. 57) serves both as a case for the jag, wire brush and combination tool, and as a handle for the combination tool and cleaning rod. The cleaning rod is attached to the case by passing the rod through the small round hole (2) until the head of the rod fits into the large round hole (2). The combination tool is attached similarly, using the two oval holes (3 and 4).

The cap is held in place by notches (5) in the end of the case.

With rifles with wooden butt, the accessories case is carried in the recess in the butt; with rifles with folding metal butt, the case is carried in the side pocket on the magazine bag.

The cap is fastened to the case by fitting the two lugs (6a) into the notches (5) in the end of the case.

When cleaning the bore, the accessories case cap is used as a cover plate for the muzzle. The cap is attached to the barrel bushing by introducing the two lugs (6a) into the circular groove in the bushing. The cap is held in this

*Shch is Cyrillic Щ, and latin N appears as Cyrillic И.

position by the barrel bushing lock, which fits into one of the four notches (6b) in the rim of the cap. The cleaning rod is inserted into the bore through the hole (6c) in the center of the cap.

CHAPTER 2

FUNCTIONING OF AUTOMATIC RIFLE

15. POSITION OF PARTS BEFORE LOADING

The rifle is set on safety. An empty magazine (8) (fig. 58) is in place in the rifle. (In combat, a fully loaded magazine will be carried in the rifle.)

The magazine catch (9) holds the magazine in the receiver. If the magazine is loaded, the top round presses against the bottom of the operating rod.

The operating rod (4) and bolt (2) are held in forward position by the return spring (5), which also holds the gas piston (6) in the gas cylinder (7). The return spring is in its position of least compression.

The bolt (2) is rotated to the right, with its locking lugs engaging the receiver locking lugs.

The gripping flange of the extractor is pressed against the center of the bolt head by the extractor spring.

The ejector head is located in the wide rear portion of the groove in the bolt.

The full automatic disconnector holds the full automatic sear (10) rotated forward and out of engagement with the automatic sear notch in the hammer.

The hammer cock notch is disengaged, and the hammer spring (11) presses the hammer (1) against the rear face of the bolt.

The firing pin (3) is in forward position, with its tip protruding out of the bolt head.

The selector is in the extreme top position, obstructing the passage of the cocking handle. The selector lever (14) (fig. 59) is rotated forward. This places the selector lever lug directly over the rear end of the disconnector and the right trigger bar, preventing both the disconnector and the trigger from rotating. Since the trigger cannot rotate, the hammer cock notch cannot engage the semiautomatic sear; thus, the hammer prevents the operating rod from moving to the rear.

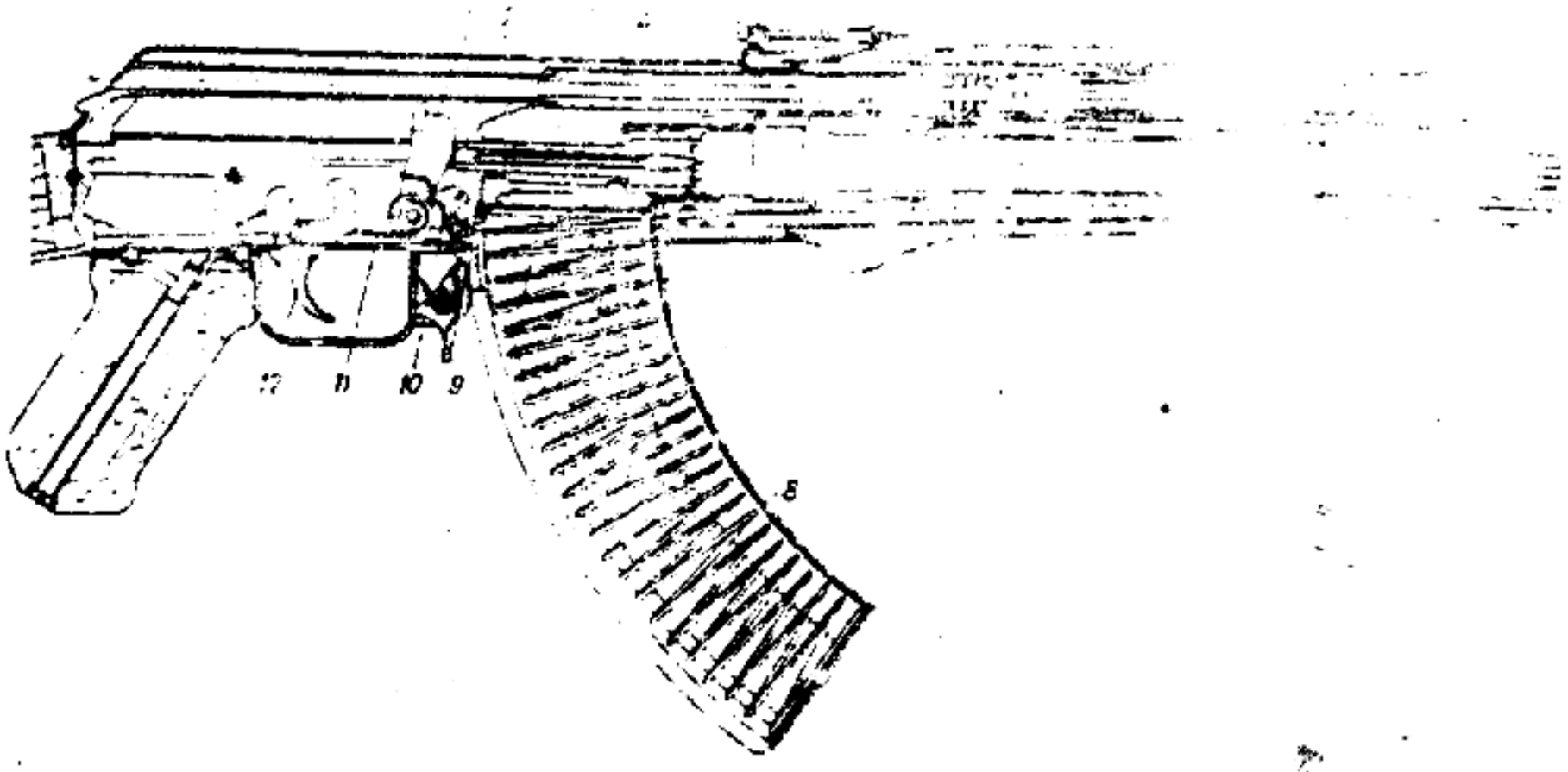

Figure 58. Position of parts before loading (vertical section).

1 - hammer; 2 - bolt; 3 - firing pin; 4 - operating rod; 5 - return spring; 6 - piston; 7 - gas cylinder; 8 - magazine; 9 - magazine catch; 10 - full automatic sear; 11 - hammer and trigger spring; 12 - trigger.

Figure 59. Trigger mechanism set on safety.

1 - hammer; 1a - disconnector notch; 1b - hammer cock notch; 1c - full automatic sear notch; 10 - full automatic sear; 10a - full automatic sear cock notch; 10b - upper end of full automatic sear; 11 - hammer and trigger spring; 12 - trigger; 14 - selector lever; 15 - disconnector; 16 - full automatic disconnector.

The hammer and trigger spring holds the trigger in forward position, with the sear raised.

16. FUNCTIONING OF PARTS DURING LOADING

The rifle is loaded as follows:

1. Insert a loaded magazine into the receiver. (This step is omitted if the magazine carried in the receiver is loaded.)

2. Set the selector by rotating it downward until the indicator is opposite the desired notation on the receiver.

3. Pull the cocking handle as far as possible to the rear and release it.

As the magazine is inserted, the magazine stop rotates the magazine catch backwards; when the magazine is fully inserted, the magazine catch spring rotates the catch forward again, and the catch engages the stop.

When the selector is set for full automatic fire (fig. 60), the passage for the cocking handle is cleared. At the same time, the selector lever lug (14) moves to the rear far enough to release the rear end of the trigger while still remaining directly above the rear end of the disconnector (15). Thus, while the trigger is free to rotate, the selector lever lug still prevents the disconnector from rotating. When the selector is set for semiautomatic fire, the selector lever moves all the way to the rear, releasing both the trigger and the disconnector (15). Thus the disconnector is free to rotate with the semiautomatic sear when the trigger (12) is pressed.*

As the cocking handle is pulled to the rear, the operating rod, which is integral with the handle, moves to the rear. The return spring is compressed. The upper end (10b) of the full automatic sear is released by the full automatic disconnector (16); making it possible for the full automatic sear spring to rotate the full automatic sear. The opening bevel in the irregular groove in the operating rod acts on the bolt

* The claws of the trigger which engage the lugs of the hammer are considered to be the semiautomatic sear.

guide lug bevel, while the lug on the rear face of the operating rod acts on the hammer; these actions begin to rotate the bolt to the left and the hammer to the rear, tensing the hammer and trigger spring.

When the operating rod reaches the extreme rear position, the bolt rotates, disengaging the bolt locking lugs from the receiver locking lugs and placing the longitudinal groove in the bolt in position for the passage of the ejector. At the same time, the bolt guide lug enters the wide portion of the irregular groove in the operating rod; as a result of this, the forward curved wall of the groove, acting on the bolt guide lug, moves the bolt to the rear.

The hammer continues to be propelled to the rear, first by the lug on the rear of the operating rod and then by the large lug forming the bottom of the operating rod. As the hammer rotates to the rear, the head of the hammer depresses the semiautomatic sear; and since the pressure on the trigger remains constant, the semiautomatic sear engages the hammer cock notch as soon as the head of the hammer has passed the sear (position of trigger mechanism as in A, fig. 60). When the hammer has reached the extreme rear position, the full automatic sear notch is located opposite the cock notch on the full automatic sear; at this point the full automatic sear spring rotates the full automatic sear to the rear, engaging the full automatic sear cock notch (10a) with the full automatic sear notch (1c) in the hammer (position of trigger mechanism as in B, fig. 60). Simultaneously, the upper end of the full automatic sear rises and obstructs the full automatic disconnector.

As soon as the bolt feed lever passes the rear wall of the magazine feed mechanism, the follower spring raises the rounds in the magazine, pushing the top round into position in front of the bolt. After this, the head of the ejector moves out of the groove in the bolt.

The rearward movement of the operating rod and bolt is arrested by the rear wall of the receiver. At this point, the return spring is at its greatest tension.

As the cocking handle is released, the return spring begins to move the operating rod forward. The perpendicular wall of the wide portion of the irregular groove in the operating rod acts on the rear surface of the bolt guide lug, thrusting the bolt forward.

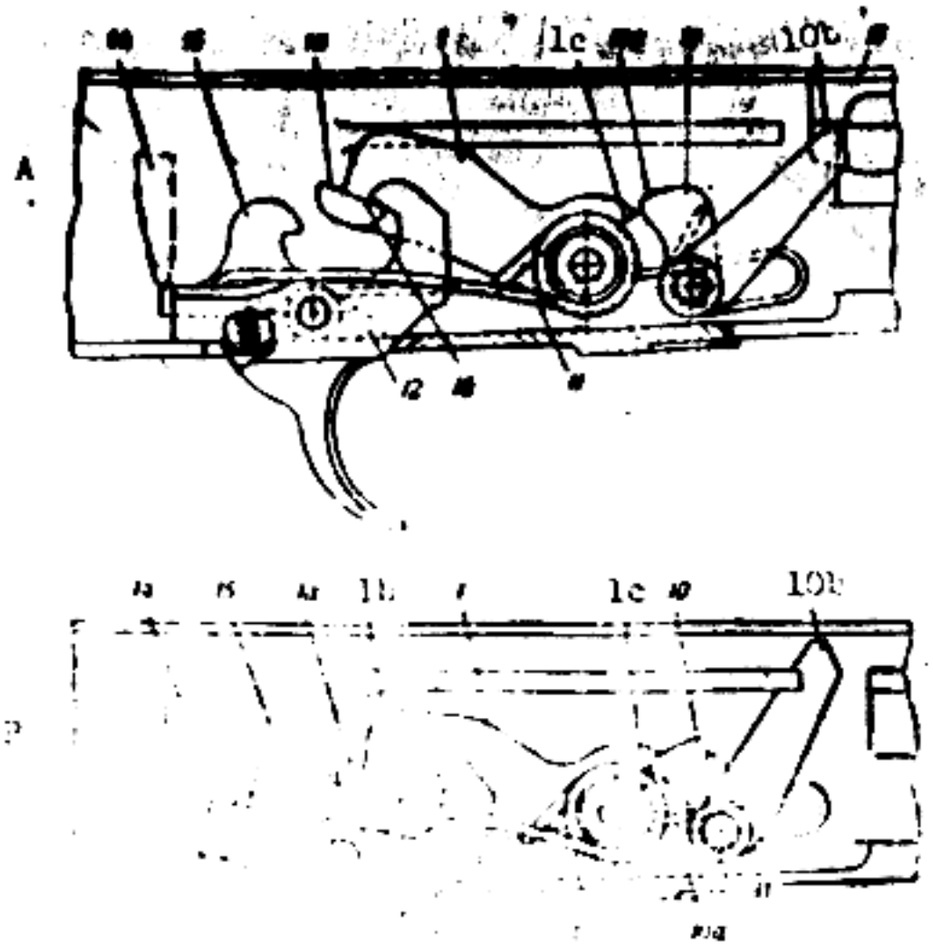

Figure 60. Trigger mechanism in position for full automatic fire.

A. Trigger released; B. Triggered pressed.

1 - hammer; 1a - disconnector notch; 1b - cock notch; 1c - full automatic sear notch; 10 - full automatic sear; 10a - full automatic sear cock notch; 10b - upper end of full automatic sear; 11- hammer and trigger spring; 12 - trigger; 14 - selector lever; 15 - disconnector; 16 - full automatic disconnector.

As the operating rod moves forward, the lower rounded portion of the rod depresses the hammer slightly. The bolt feed lever extracts the top round from under the magazine flange. The ejector enters the groove in the bolt. The round is directed into the chamber by the guides in the receiver and in the rear face of the chamber.

As the bolt approaches the barrel, the screw bevel on the left locking lug runs over the receiver cam surface screw bevel, rotating the bolt to the right and disengaging the bolt guide lug from the irregular groove in the operating rod. The ejector grip engages the groove behind the rim of the cartridge case, and the base of the case positions itself in the bolt face.

The firing pin (3) (fig. 63) moves to the rear, in which position the rear end of the pin protrudes from the rear of the bolt.

When the operating rod reaches the extreme forward position, the irregular groove closing bevel acts on the bolt guide lug bevel, rotating the bolt further to the right and engaging the bolt locking lugs with the receiver locking lugs. The bore is now sealed.

After the bore is sealed, the operating rod continues to move forward. The full automatic disconnector rotates the upper end of the full automatic sear forward, disengaging the full automatic sear cock notch (10a) (fig. 60) from the full automatic sear notch in the hammer. The hammer rotates forward, engaging its semiautomatic sear notch (1a) (fig. 61) with the semiautomatic sear. This is accompanied by an audible click.

With the parts in this position, the automatic rifle is ready to be fired (see fig. 63).

17. FUNCTIONING OF PARTS DURING SEMIAUTOMATIC FIRE

To fire a single round from the rifle, set the selector for semiautomatic fire by rotating the indicator as far downward as possible, and press the trigger with the index finger of the right hand.

When the trigger is pressed, the semiautomatic sear and disconnector rotate. The rear end of the sear (i.e., trigger) raises the ends of the trigger and hammer spring. As the trigger rotates, the semiautomatic sear releases the hammer cock notch.

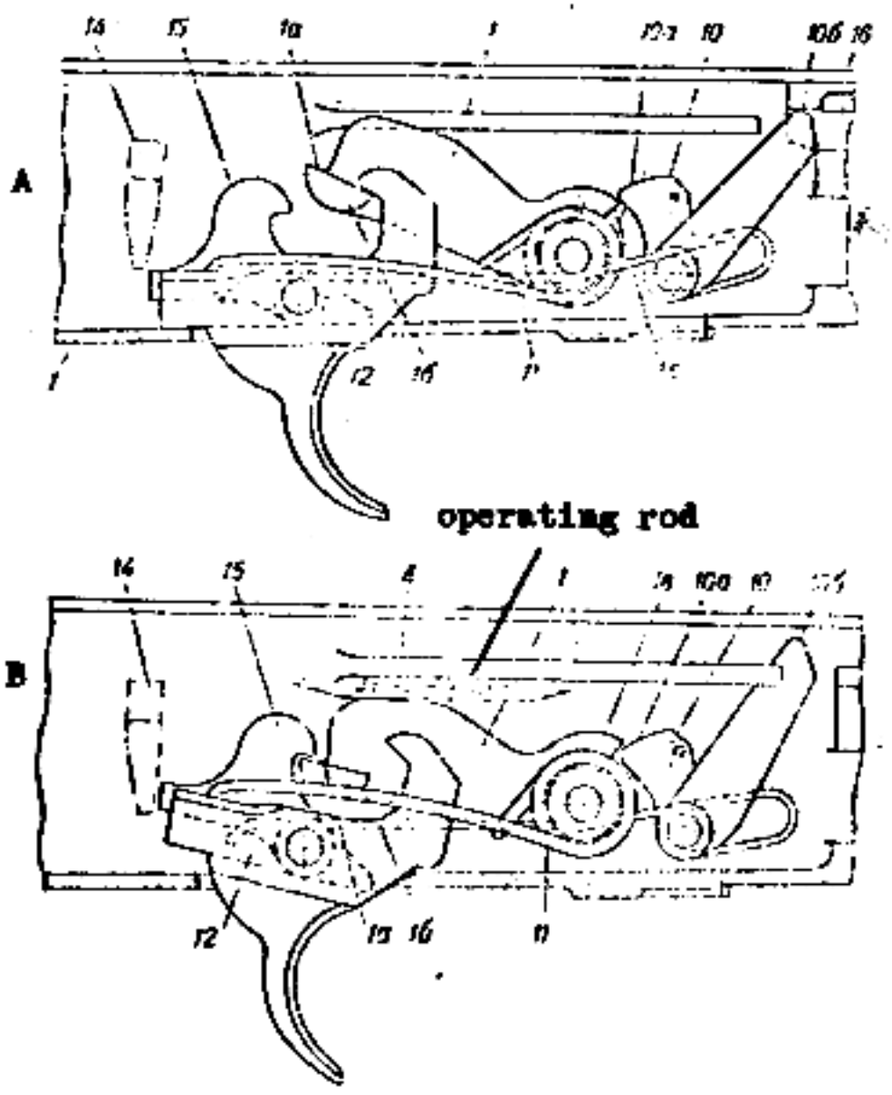

Figure 61. Trigger mechanism in position for semiautomatic fire.

A. Trigger released; B. Trigger pressed.

1 - hammer; 1a - disconnector notch; 1b - cock notch; 1c - full automatic sear notch; 4 - operating rod lug; 10 - full automatic sear; 10a - full automatic sear cock notch; 10b - upper end of full automatic sear; 11 - hammer and trigger spring; 12 - trigger; 14 - selector lever; 15 - disconnector; 16 - full automatic disconnector.

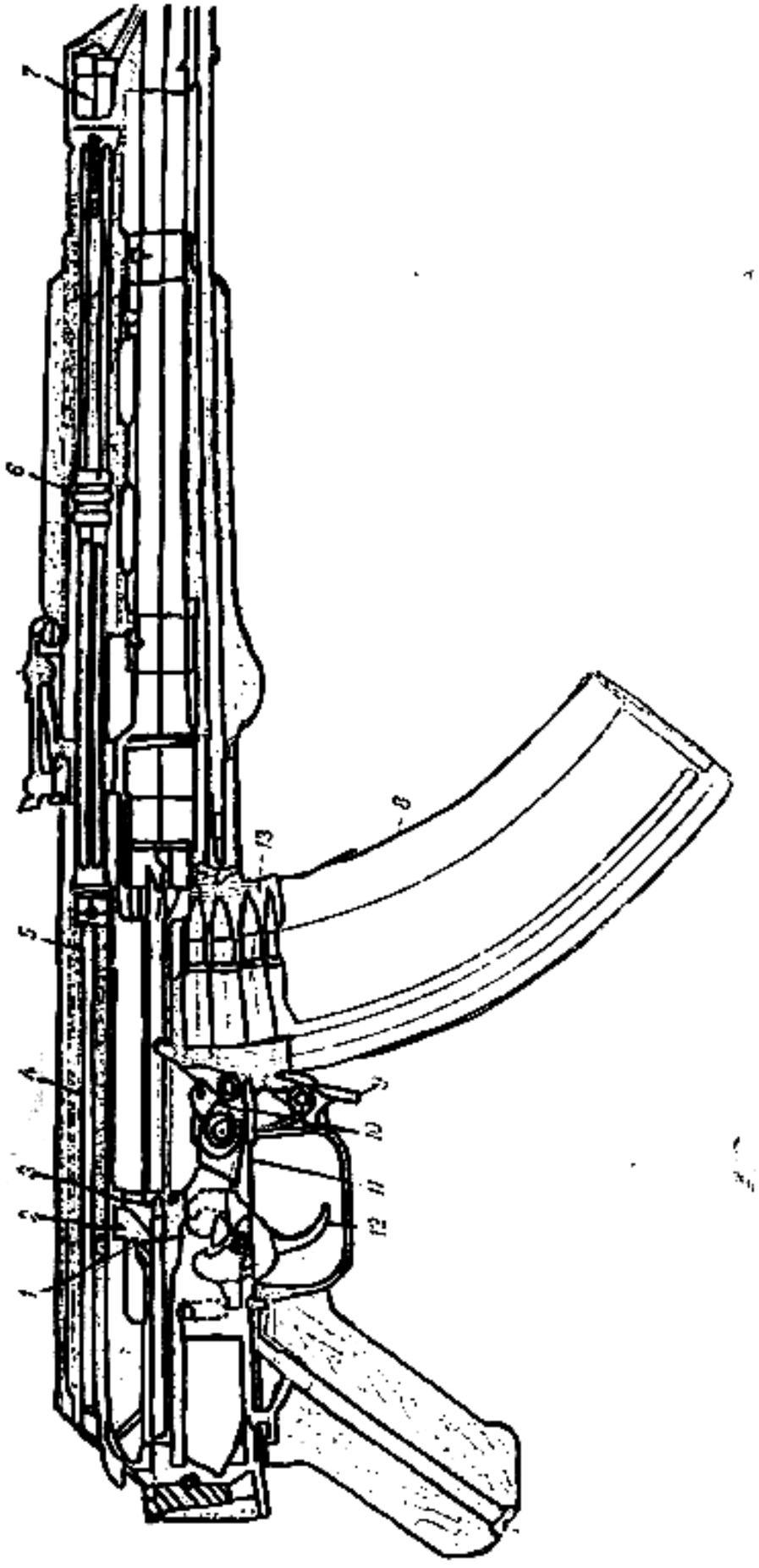

Figure 62. Position of parts with operating rod in extreme rear position.

1 - hammer; 2 - bolt, 3 - firing pin; 4 - operating rod; 5 - return spring; 6 - gas piston; 7 - gas cylinder; 8 - magazine; 9 - magazine catch; 10 - full automatic sear; 11 - trigger and hammer spring; 12 - trigger; 13 - rounds.

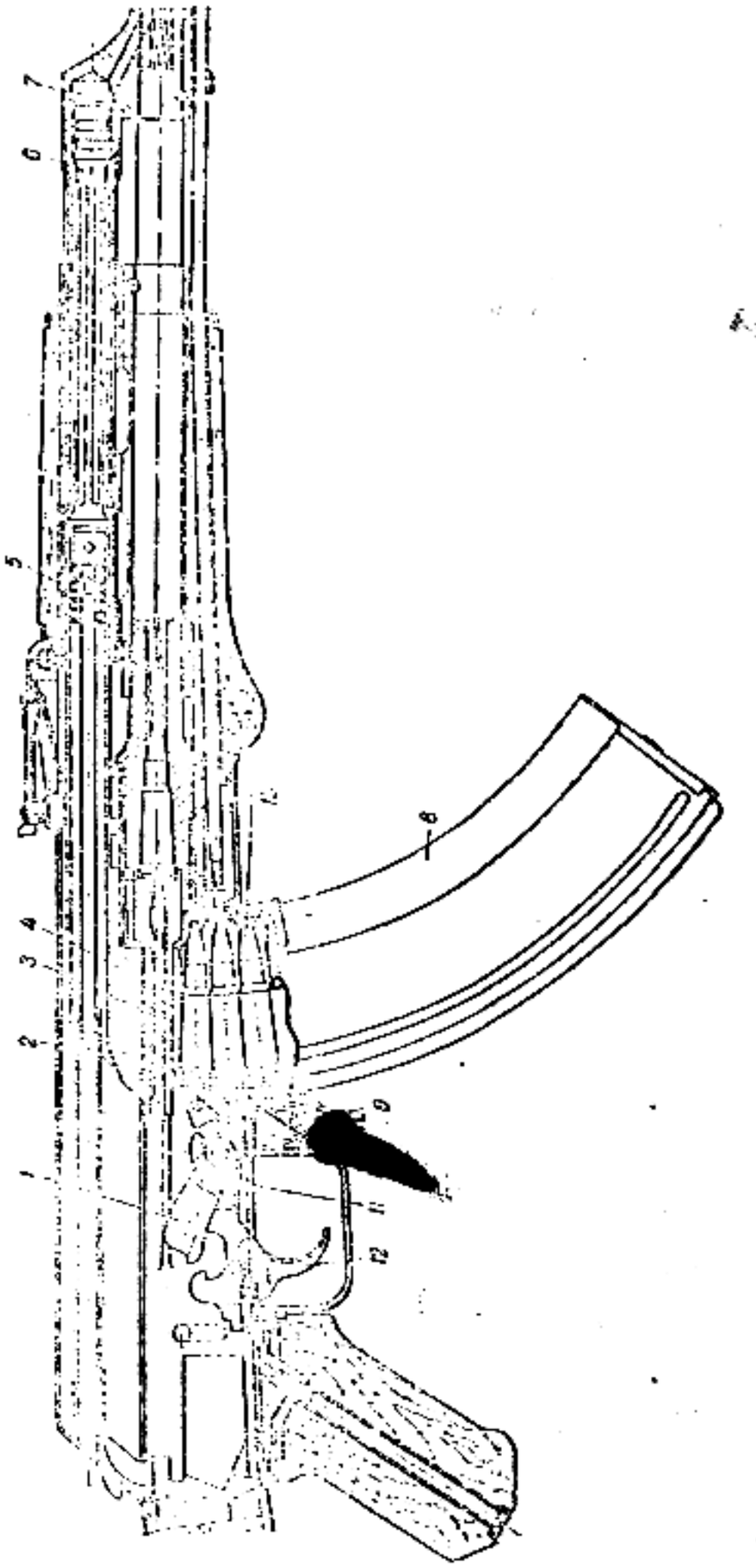

Figure 63. Position of parts after loading and before firing.

1 - hammer; 2 - bolt; 3 - firing pin; 4 - operating rod; 5 - return spring; 6 - gas piston; 7 - gas cylinder; 8 - magazine; 9 - magazine catch; 10 - full automatic sear; 11 - trigger and hammer spring; 12 - trigger; 13 - rounds.

The trigger and hammer spring rotates the hammer forward. The hammer strikes the rear end of the firing pin, thrusting it forward forcibly until the point of the pin strikes the primer, igniting the primer charge. The flash from the primer charge is transmitted to the propellent charge through ports in the base of the cartridge case.

The powder gases force the bullet to cut itself into the rifling and to move through the bore. After the bullet has passed the gas port in the barrel, powder gases enter the gas cylinder (7) (fig. 63) and force the gas piston (6) and operating rod to move to the rear.

As the operating rod moves to the rear, the return spring is tensed. The opening bevel in the operating rod irregular groove acts on the bolt guide lug, rotating the bolt to the left and opening the breech.

After the breech is open, the operating rod and bolt move to the rear together. The operating rod rotates the hammer to the rear, tensing the hammer and trigger spring. As the hammer rotates, it rotates the disconnector. When the head of the hammer has passed the notch in the disconnector, the disconnector spring forces the disconnector to engage the disconnector notch in the hammer. This holds the hammer at full cock.

The full automatic sear spring rotates the full automatic sear into engagement with the full automatic sear notch in the hammer. The full automatic sear, however, does not hold the hammer in the cocked position, since the disconnector (15, fig. 61) is already performing this function. As the full automatic sear rotates, the upper end of the sear rises to obstruct the passage of the full automatic disconnector.

As the bolt moves to the rear, the extractor pulls the cartridge case out of the chamber. When the case strikes the ejector, it is ejected from the receiver.

The top round in the magazine is forced upward by the follower until it is arrested by the magazine flange.

The rearward movement of the operating rod and bolt is arrested by the rear wall of the receiver. Forward movement of these parts is effected by the energy of the compressed return spring.

As the operating rod moves forward, the bolt feed lever extracts the top round from the magazine and pushes it into the chamber.

As the bolt approaches the barrel, the first stage in the rotation of the bolt to the right takes place. At the same time, the extractor engages the groove behind the rim of the cartridge case. As the operating rod moves to the extreme forward position, it produces the final rotation of the bolt to the right, sealing the bore.

After the bore is sealed, but while the operating rod is still 3-6 mm from the extreme forward position, the full automatic disconnector (which is integral with the operating rod) strikes the upper end of the full automatic sear and rotates the sear forward. This moves the full automatic sear away from the hammer so that the hammer will not be prevented from rotating.

The next round is fired by releasing the trigger and then pressing it again.

When the trigger is released, the hammer and trigger spring rotates the disconnector and semiautomatic sear to the rear, disengaging the disconnector from the disconnector notch in the hammer. The trigger and hammer spring (11) (fig. 61) rotates the hammer (1) until the hammer cock notch (1b) engages the semiautomatic sear. This is accompanied by an audible click.

When the trigger is again pressed, the semiautomatic sear releases the hammer cock notch. The hammer once again strikes the firing pin, and the entire operating cycle of the automatic mechanism is repeated.

18. FUNCTIONING OF PARTS DURING FULL AUTOMATIC FIRE

To fire the rifle fully automatically, set the selector on full automatic fire by rotating the indicator until it is opposite the letters AV on the receiver, and press the trigger with index finger of the right hand.

When the trigger is pressed, it rotates on the trigger pin. The disconnector (15) (fig. 60) does not engage the disconnector notch in the hammer, since the disconnector is prevented from rotating by the selector lever (14).

As the trigger rotates, the semiautomatic sear releases the hammer cock notch. The hammer and trigger spring rotates the hammer, which strikes the firing pin forcibly. The round is fired. The powder gases act on the gas piston, thrusting the operating rod to the rear, opening the breech, extracting and ejecting the cartridge case, and cocking the hammer.

The full automatic sear engages the full automatic sear notch in the hammer, holding the hammer at full cock.

The top round in the magazine is raised by the follower.

As the operating rod and bolt are moved forward by the return spring, the round is inserted into the chamber and the breech is sealed.

When the operating rod is 3-6 mm from the extreme forward position, the full automatic disconnector strikes the upper end of the full automatic sear and rotates the sear, releasing the hammer. The hammer strikes the firing pin, firing the next round. The entire operating cycle of the automatic mechanism is repeated.

The rifle will continue firing until the last round in the magazine is used or until the firer releases the pressure on the trigger. In the first case, the operating rod and bolt will remain in the forward position and the hammer will not be cocked. In the second case, a round will be inserted into the chamber and the hammer will remain cocked; the rifle will cease firing but will remain loaded.

19. FUNCTIONING OF PARTS DURING UNLOADING

The rifle is unloaded as follows:

1. Withdraw the magazine.

2. Pull the cocking handle as far to the rear as possible and release it.

3. Release the hammer by pressing the trigger.

4. Set the safety.

As the cocking handle is pulled to the rear, the extractor pulls the cartridge case out of the chamber and holds it against the bolt head. When the base of the cartridge case strikes the ejector, it is ejected from the receiver.

When the cocking handle is released, the return spring returns the operating rod and bolt to the forward position.

When the trigger is pressed, the semiautomatic sear releases the hammer cock notch; the hammer and trigger spring rotates the hammer, which strikes the bolt.

When the safety is set, the parts are in the same positions occupied before loading (see Section 15).

CHAPTER 3

DISASSEMBLY AND ASSEMBLY

20. GENERAL INSTRUCTIONS

The rifle may be disassembled for cleaning, lubrication, inspection, and replacement or repair of defective parts.

The following instructions should be observed during disassembly and assembly:

1. The rifle should be disassembled on a table or bench. In the field, a clean covering should be spread on the ground.

2. The parts should be laid out in order of disassembly.

3. Force should not be used to remove or disassemble parts, as this may result in damage to the parts.

4. Only accessories in good condition should be used.

5. When tightening or loosening screws, the screwdriver is to be held firmly in the hand, and the screwdriver blade is to be held in the screw notch at an angle.

6. The automatic rifle is to be field stripped for cleaning and lubrication after firing, exercises, and detail, and also for inspection.

7. The automatic rifle is to be detail stripped for removing storage or factory lubrication, for changing to a new lubrication, for replacing damaged parts and for repair, whenever it is extremely dirty or moist.

8. Disassembly, assembly, cleaning and lubrication are performed under the supervision of an officer.

9. Before the rifle is disassembled, make sure there is no round in the chamber.

21. FIELD STRIPPING

1. Remove the magazine from the rifle. Holding the rifle by the fore end with the left hand, rotate the rifle a certain

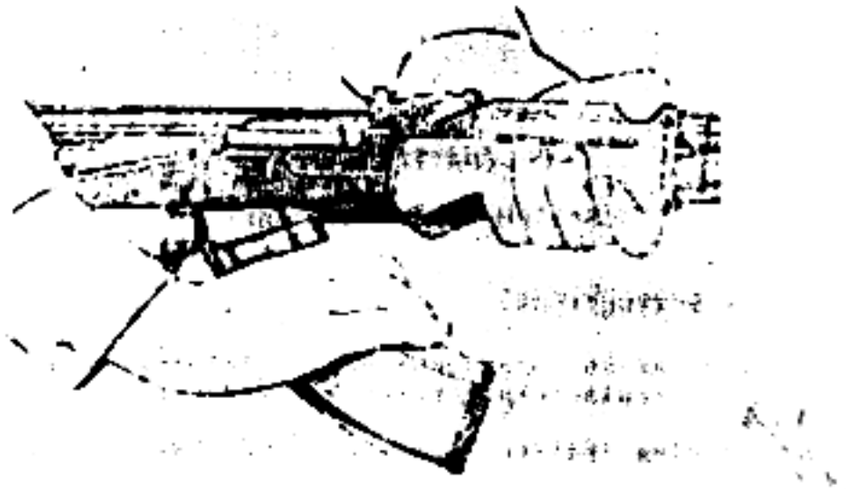

Figure 64. Removing the magazine from the rifle.

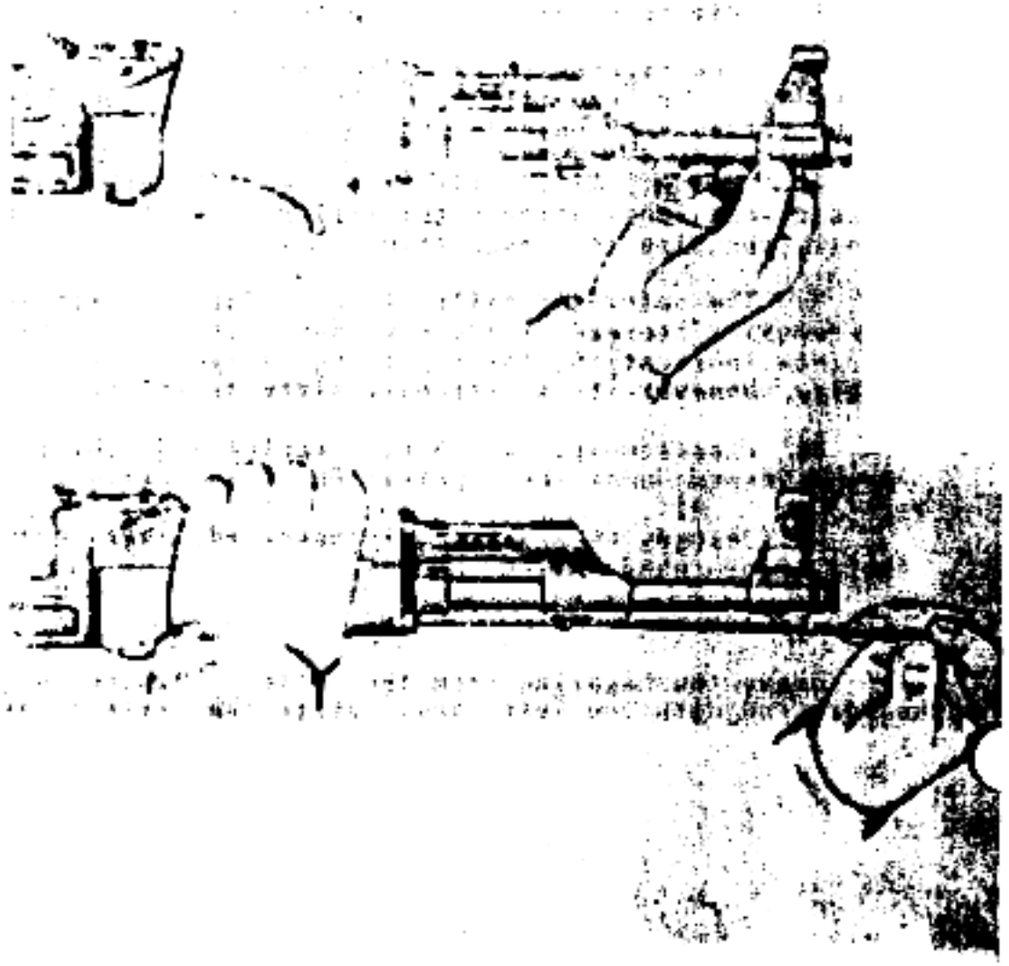

Figure 65. Removing the cleaning rod from the rifle.

amount, pushing the magazine away. Grasp the magazine with the right hand, and, depressing the magazine catch with the thumb of the right hand, rotate the magazine forward and remove it from receiver hole (fig. 64).

2. Take the rifle off safety. Rotate the selector indicator downward as far as possible with the thumb of the right hand.

3. Check to see that there is no round in the chamber. Pull the operating rod to the rear and inspect the chamber and bolt face.

4. Remove the case with accessories from the stock. Depress the butt plate cover with the index finger of the right hand and remove the case with accesories from the stock; remove the accessories from the case.

5. Remove the cleaning rod from the rifle. Place the stock of the rifle on the ground and hold in this position by means of the hand guard and fore end; take the cleaning rod with the fingers of the right hand and, bending it slightly, remove the cleaning rod head from the stop in the base of the front sight; move the cleaning rod upward so that its head leaves the forward face of the base of the front sight; remove the cleaning rod with the right hand (fig. 65). It is permitted to use a punch to remove the cleaning rod.

6. Remove the receiver cover. Lean the rifle against a table and, holding the rifle by the forward part of the butt with the right hand, depress the guide face with the thumb into the cover hole, and raise the cover with the left hand (fig. 66).

7. Remove the return mechanism from the rifle. Holding the rifle by the forward portion of the receiver with the left hand, move the return spring guide forward until its rear face leaves the groove in the receiver rear plate; lift the guide rear face and remove the return mechanism from the operating rod channel (fig. 67).

The return mechanism may also be removed by placing the rifle on a table. In this case the rifle is held by the pistol grip with the left hand.

8. Remove the operating rod with bolt from the receiver. Holding the rifle by the forward portion of the receiver with the left hand, and the cocking handle with the right hand, bring the operating rod with bolt to the rear as far as

Figure 66. Removing the cover from the receiver.

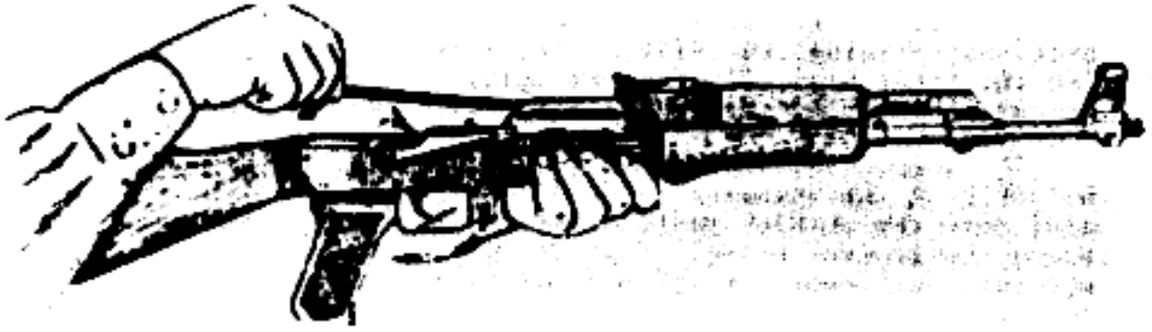

Figure 67. Removing the return mechanism from the operating rod.

possible, and, moving the operating rod forward a distance of 1 to 2 mm, raise its rear portion; bringing the operating rod to the rear, remove it together with the bolt from the receiver.

The operating rod with bolt may also be removed by placing the rifle on a table. In this case, the rifle is held by the pistol grip with the left hand.

9. Remove the bolt from the operating rod. Take the operating rod in the left hand with the cam surface facing upward, and rotate the bolt a small amount with the right hand so that the guide lug leaves the wide part of the variable groove in the operating rod, and then move the bolt to the rear as far as possible; rotating the bolt, remove its guide lug from the variable groove of the operating rod and remove the bolt from the operating rod by moving it forward (fig. 68).

10. Remove the gas tube with hand guard from the barrel. Holding the rifle by the forward portion of the receiver with the left hand, rotate the lock lever upward with the right hand; rotate the gas tube upward by means of the rear end of the receiver and remove it from the gas cylinder.

22. ASSEMBLY AFTER FIELD STRIPPING

The rifle is assembled after field stripping in reverse order.

1. Attach the gas tube with hand guard to the barrel. Holding the rifle by the forward portion of the receiver with the left hand, install the gas tube on the gas cylinder with the right hand and depress the rear end of the gas tube as much as possible; rotate the gas tube lock downward so that the lever lock enters the recess in the right wall of the rear sight base.

2. Attach the bolt to the operating rod. Grasp the operating rod with the left hand with the cam surface upward, and with the right hand install the bolt in the operating rod channel so that the rear cylindrical portion is in the operating rod lug; rotate the bolt so that the guide edge enters the variable groove in the operating rod, and then move the bolt forward (fig. 69).

3. Install the operating rod with bolt in the receiver. Hold the rifle by the forward portion of the receiver with the left hand, and with the thumb of the right hand, hold the bolt in the forward position, then insert the piston into the gas

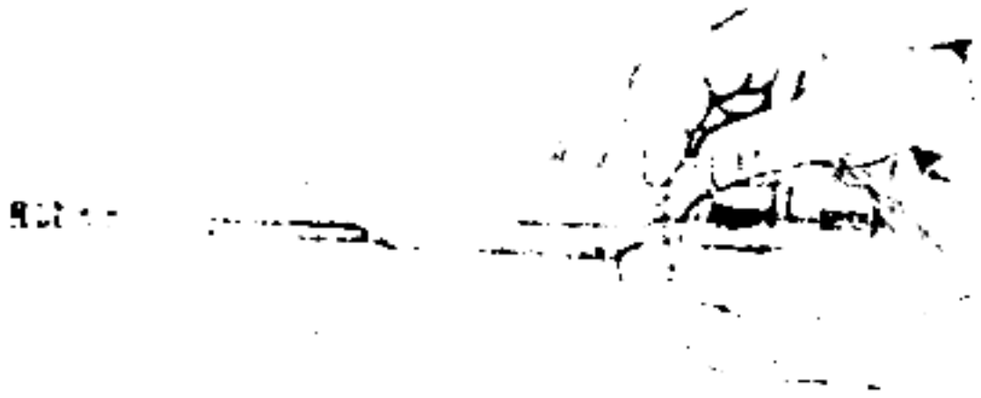

Figure 68. Removing the bolt from the operating rod.

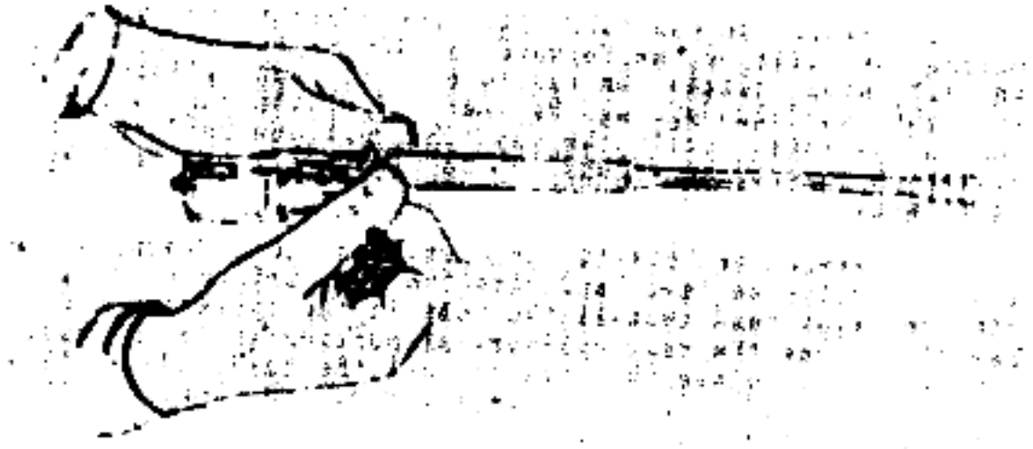

Figure 69. Attaching the bolt to the operating rod.

tube and insert the operating rod with bolt into the receiver so that the guide lugs of the operating rod and the lugs of the bolt are opposite the notches in the guide on the receiver; depress the rear portion of the operating rod so that its guide grooves coincide with the guide, and move the operating rod to the extreme forward position (fig. 70).

4. Install the return mechanism in the operating rod. Hold the rifle by the forward portion of the receiver with the left hand, and with the right hand insert the return mechanism into the operating rod channel (fig. 71), move the guide tube rear face forward and, placing its guide lugs opposite the grooves in the receiver rear plate, depress the guide tube rear face; in this position, the rear face should enter the groove in the receiver rear plate.

5. Install the cover on the receiver. Hold the rifle by the forward portion of the receiver with the left hand, and with the right hand insert the cover so that its forward face enters the semicircular groove in the rear sight base and move the cover forward as far as possible; press the rear portion of the cover forward and downward, thus completing the installation (fig. 72).

6. Install the cleaning rod in the rifle.

7. Insert the accessories into the case and insert the case into the recess in the butt.

8. Install the magazine on the rifle. Hold the rifle by the fore end with the left hand, and rotate the rifle a certain amount; insert the upward forward portion of the magazine into the hole in the receiver with the right hand so that the magazine catch enters the notch in the receiver; rotate the magazine to the rear so that the catch is engaged by the magazine stop.

9. Release the hammer from the semiautomatic sear, and turn on the safety, rotating the selector indicator upward.

23. DETAIL STRIPPING

Detail stripping of the rifle is a continuation of field stripping.

Detail stripping is performed in the following manner: field strip the rifle as instructed in section 21, and then perform the following:

Figure 70. Attaching the operating rod with bolt to the receiver.

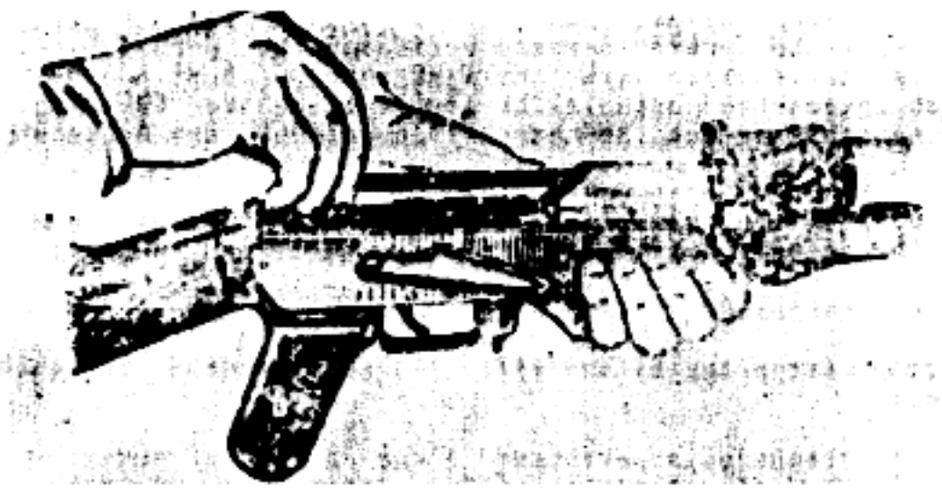

Figure 71. Attaching the return mechanism to the operating rod.

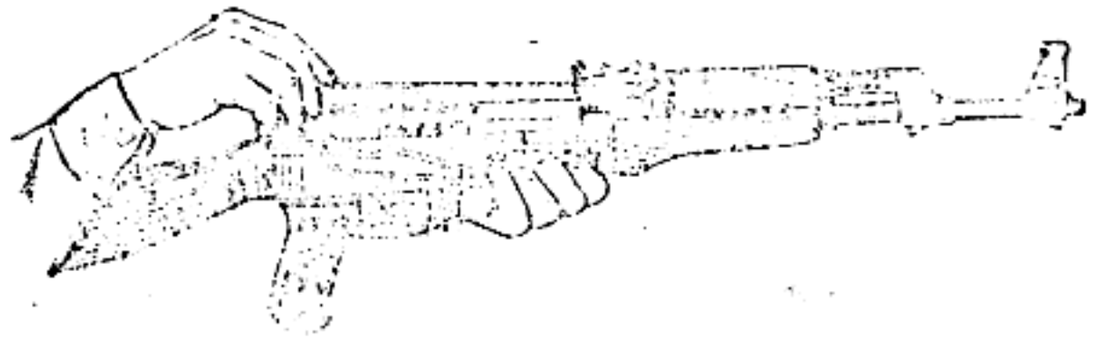

Figure 72. Attaching the cover to the receiver.

Figure 73. Disassembly of the return mechanism.

1. Disassemble the return mechanism.

Insert the cleaning rod into the guide tube until the cleaning rod head is stopped by the guide rod, and place the cleaning rod against a table.

Compress the return spring with the left hand and remove the washer from the guide rod with the right hand (fig. 73).

Remove the return spring from the rifle and remove the guide rod from the guide tube.

2. Disassemble the bolt.

Grasp the bolt with the left hand with the feed lever upward, and with the right hand remove the firing pin pin from the bolt body using a punch.

Remove the firing pin from the bolt.

Holding the extractor with the thumb of the left hand, remove the extractor pin, using a punch.

Remove the extractor and extractor spring from the recess in the bolt body.

3. Disassemble the firing and trigger mechanism.

Remove the stop end of the full automatic sear spring from the trigger pin by means of a punch.

Punch the trigger pin to the left using the punch, the remove the trigger with disconnector and spring from the receiver.

Separate the disconnector from the trigger and remove the semiautomatic sear spring from its recess.

Rotate the selector indicator upward until the lug on the lever coincides with the notch in the wall of the receiver hole, and separate the selector from the receiver (fig. 74).

Depress the stop end of the full automatic spring, using a punch or wooden rod, and punch out the hammer pin to the left by means of a punch; remove the hammer and hammer and trigger spring from the receiver, and remove the hammer.

Punch out the full automatic sear pin to the left using a punch; remove the full automatic sear and sear

spring from the receiver, and remove the spring from the sear.

In combat units, the firing and trigger mechanism is disassembled for the purpose of changing lubrication, under the supervision of an armorer-artificer.

In the event the firing and trigger mechanism becomes dirty, the rifle is cleaned and lubricated without disassembling it.

NOTE: In the automatic rifle with stamped receiver, the firing and trigger mechanism may be disassembled in the artillery workshop only for the purpose of repair or replacement of parts.

4. Remove the fore end from the barrel.

Hold the forward portion of the hand guard with the left hand, and with the right hand rotate forward as far as possible the fore end band lock indicator by means of a punch, and move the stop band toward the gas cylinder.

Move the fore end forward with the right hand so that its lug on the rear face is disengaged from the recess in the receiver, and then disengage the fore end by pulling downward.

Further disassembly of the rifle is performed in the artillery repair shop.

24. ASSEMBLY AFTER DETAIL STRIPPING

1. Attach the fore end to the barrel.

Hold the rifle by the forward portion of the receiver with the left hand, and with the right hand insert the fore end so that its lug on the rear face enters the recess in the receiver, and move the fore end forward as far as possible.

Mount the band on the fore end shoulder as tightly as possible, and rotate the lock to the rear so that its indicator enters the notch on the band.

If the lock indicator does not rotate to the rear, it is necessary to move the band along the barrel, and at the same time to press upward on the lock indicator, in this manner alining the lock with the recess in the barrel, and then rotate the lock.

2. Assemble the firing and trigger mechanism.

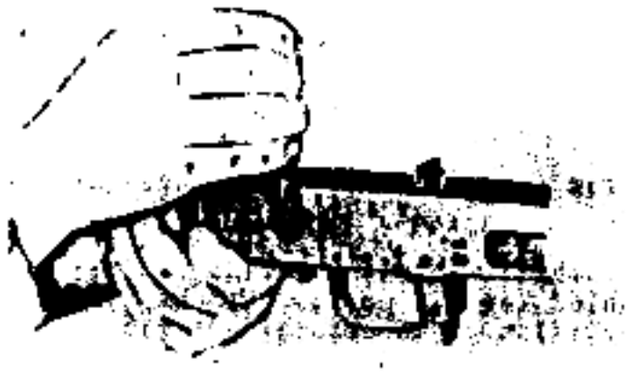

Figure 74. Removing the selector from the receiver.

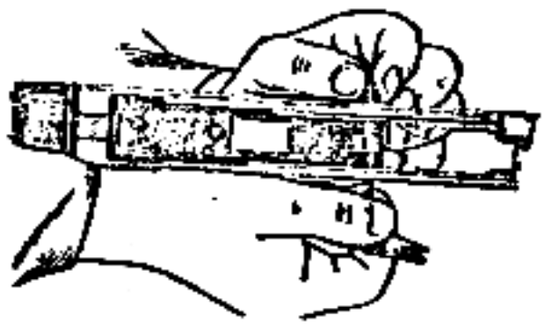

Figure 75. Installing the full automatic sear pin.

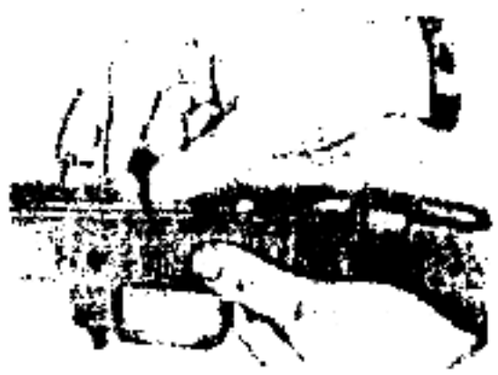

Figure 76. Installing the hammer with hammer and trigger spring to the receiver.

Attach the full automatic sear spring to the full automatic sear and insert the sear with spring into the receiver so that the stop end of the spring points to the rear.

From the right side of the receiver, insert the punch into the hole for the full automatic sear pin.

Insert the full automatic sear pin into the hole from the left side of the receiver and, while continually removing the punch, install the full automatic sear pin (fig. 75).

Mount the hammer and trigger spring on the hammer pins and insert the hammer with hammer and trigger spring into the receiver (fig. 76).

Insert the punch in the hole for the hammer pins from the right side of the receiver.

Insert the hammer pin into the hole through the left side of the receiver, and press back the stop end of the full automatic sear spring with the pin; while removing the punch, insert the hammer pin (fig. 77) and place the stop end of the full automatic sear spring into the recess in the pin.

Assemble the selector to the receiver and set it on semiautomatic fire.

Install the disconnector and disconnector spring into the trigger groove and insert the trigger and sear into the hole in the receiver (fig. 78).

Through the right side of the receiver, insert the punch into the hole for the trigger pin, after raising the stop end of the full automatic sear spring.

Insert the trigger pin into the hole through the left side of the receiver; while removing the punch, install the trigger pin and set the stop end of the full automatic sear spring in the recess in the pin.

Raise the ends of the hammer and trigger spring by means of the punch and place the bent ends of the spring on the rear shoulders of the trigger.

3. Assemble the bolt.

Insert the extractor and spring into the bolt recess; depress the extractor with the thumb of the left hand to set it in the recess; set the extractor pin in the hole with the right hand so that the notch on the upper end of the pin is turned in the direction of the rear cylindrical portion of the bolt body. (See fig. 79).

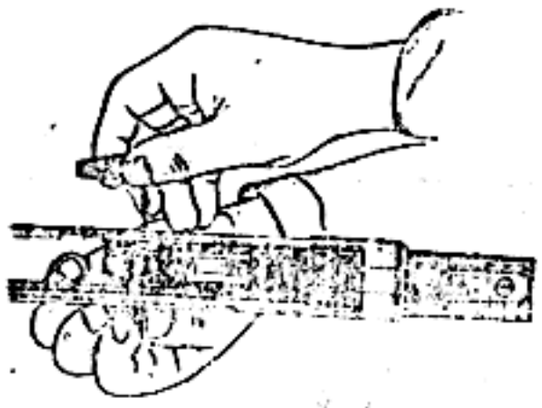

Figure 77. Installing the hammer pin.

Figure 78. Installing the trigger with disconnector in the receiver.

Figure 79. Installing the extractor pin in the bolt.

Insert the firing pin into the bolt so that the recess in the firing pin is alined with the hole for the pin (fig. 80); in order to control the position of the firing pin in the hole for the firing pin retaining pin, it is necessary to insert the punch from the side of the feed lever so that the firing pin can rotate and interfere with the installation of the firing pin retaining pin.

Insert the firing pin retaining pin into its hole.

4. Assemble the return mechanism.

Insert the guide rod into the guide tube.

Insert the cleaning rod into the guide tube until the cleaning rod head butts against the guide rod and, pressing the cleaning rod against the table, install the return spring.

Compress the return spring with the left hand, and with the right hand install the washer on the guide rod (fig. 81).

Further assembly of the rifle is performed by following the order given in Section 22.

25. DISASSEMBLY OF THE MAGAZINE

Remove the cover plate from the magazine. Grasping the magazine in the left hand, depress the stop plate (fig. 82) by means of the punch (through the hole in the cover plate) and move the cover plate so that the stop lug is disengaged from the hole in the cover plate; hold the stop plate with the thumb of the left hand and remove the cover plate with the right hand.

Remove the cover plate with spring and follower from the magazine. Release the stop plate and remove the spring together with the stop plate and follower from the magazine.

Remove the follower and stop plate from the spring.

26. ASSEMBLY OF THE MAGAZINE

Assemble the follower and stop plate to the spring.

Insert the spring with follower and stop plate in the magazine. Grasp the magazine with the left hand (cover plate upward, rear groove inward), and with the right hand insert the spring with follower and stop plate in the magazine.

Attach cover plate to magazine. Depress the stop plate in the magazine body and, holding it with the thumb of the

Figure 80. Installing the firing pin in the bolt.

Figure 81. Assembly of the return mechanism.

Figure 82. Removing the cover plate from the magazine.

Figure 83. Installing the spring with follower and stop plate to the magazine.

left hand, move the cover plate onto the flanges of the magazine body (fig. 84) with the right hand until the lugs of the cover plate press against the rear wall of the magazine.

27. DISASSEMBLY AND ASSEMBLY OF THE AUTOMATIC RIFLE IN REPAIR SHOP

In addition to detail and field stripping and assembly, disassembly and assembly of the pistol grip, sights, and butt are also performed in the repair shop.

Disassembly

1. Remove the pistol grip from the receiver. Loosen the screw by means of the screw-driver and remove the pistol grip from the receiver.

2. Disassemble the wooden butt.

Knock out the butt screw with the punch and remove the butt from the receiver.

Unscrew the rear screws with the screw driver and remove the clamp from the butt.

Unscrew the screws in the butt plate with the screw driver, and remove the butt plate and cover plate from the butt .

2a. Disassemble the folding metal stock.

Knock out the nut pin with the punch and remove the nut from the stock.

Knock out the stock catch pin through the hole in the base of the receiver using the punch and remove the catch plunger with spring from the stop pin.

Move the stop pin to the left so that the ends of the stop pin of the pin leave the notches in the wall of the receiver, and remove the stop pin from stock pin hole.

Remove the stock pin from the hole in the receiver and remove the catch from the receiver; remove the bars from the receiver.

Remove the swivel base from the stock pin.

NOTE: The folding metal stock of automatic rifles with stamped receiver is to be disassembled only in exceptional circumstances for repairing and replacing parts.

Figure 84. Installing cover plate in the magazine.

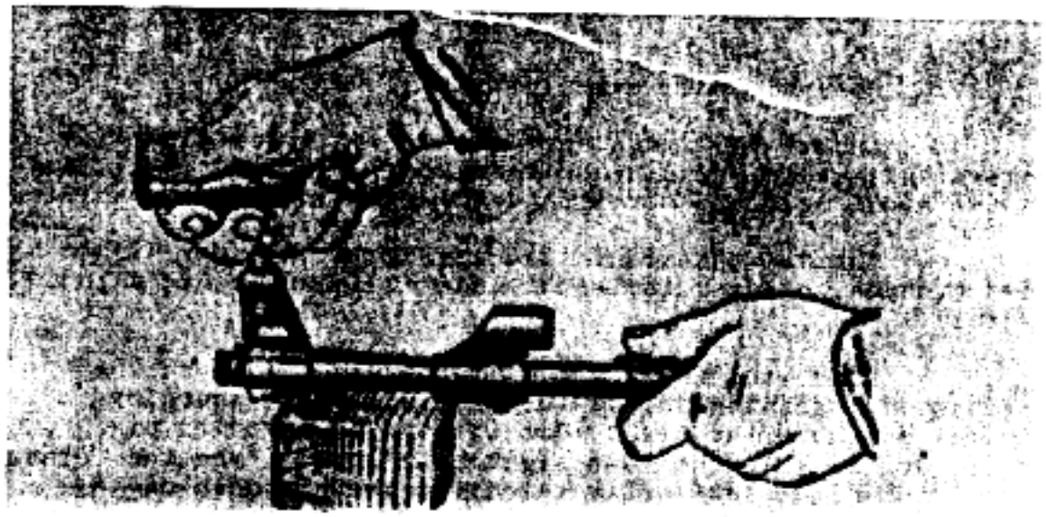

Figure 85. Removing the front sight from the stud.

3. Remove the front sight from the front sight stud. Hold the rifle by the barrel with the left hand, unscrew the front sight from the front sight stud using the screw-driver, rotating the screw-driver in the counter-clockwise direction.

4. Remove the front sight stud from the front sight base. Place the muzzle of the rifle on a table or wooden stand and knock out the front sight stud using a punch or wooden rod (fig. 86).

NOTE: The front sight and stud are to be removed only for repair. After installing the front sight and stud, it is necessary to check the accuracy of the rifle.

5. Disassemble the rear sight.

Hold the sight leaf at an angle of 40 to 50 degrees and press on the forward end of the sight leaf using a punch or wooden rod, and move the sight leaf to the rear until the pins leave the holes in the rear sight base lug.

Using a punch and hammer, knock out the sight leaf spring from the grooves in the sight base, and remove the spring from the sight base.

Press on the slide catch, move the slide along the sight leaf and remove it, and remove the catch and catch spring from the recess in the slide.

Assembly

1. Assemble the rear sight.

Insert the catch spring and catch into the slide recess and, while pressing on the catch, install the slide on the sight leaf and move it to the rear as far as possible.

Install the sight leaf spring in the rear sight base grooves, holding the sight leaf at an angle of 40 to 50 degrees.

Place the forward end of the sight leaf on the spring and, pressing on the forward end with a punch or wooden rod, move the sight leaf forward so that its pins enter the holes in the rear sight base lugs. Free the forward end of the sight leaf after releasing the pressure on it.

2. Assemble the front sight.

Insert the front sight stud into the base hole until the alinement marks coincide.

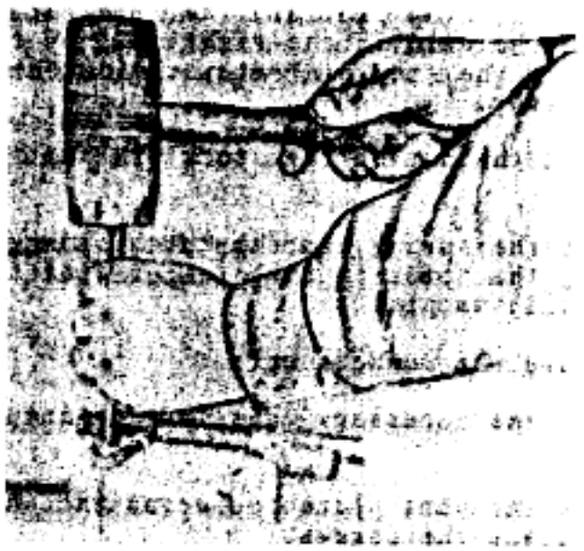

Figure 86. Removing the stud from the front sight base.

Screw the front sight into the stud base, using the screw-driver.

3. Assemble the folding metal stock.

Install the swivel base on the stock pin.

Attach the bars to the receiver and insert the catch into the receiver.

Insert the stock pin into the hole in the left bar and the hole in the left wall of the receiver, and mount the catch on the pin.

Insert the stop pin into the hole for the stock pin, and the pin into the hole in the right wall of the receiver so that the end of the stop pin enter the notches in the right wall of the receiver.

Install the nut on the stock pin and insert the nut pin.

Insert the spring and the catch plunger in the stock pin and, alining the holes in the plunger with the holes in the catch, install the pin.

4. Assemble the wooden butt.

Insert the accessory case spring into the recess in the butt.

Attach the butt plate cover and the butt plate to the butt and replace the screws.

Mount the clamp on the butt face and replace end screws.

Attach butt to receiver and replace butt pins.

CHAPTER 4

INSPECTION OF THE AUTOMATIC RIFLE

28. GENERAL

For timely discovery and removal of defects in automatic rifles, and also of irregularities in their storage and care, the automatic rifles are inspected according to the instructions given in the unit interior economy regulations.

The technical condition of automatic rifles is characterized by their readiness for combat employment and, in addition, by the degree of their wear as a result of use.

Depending upon the degree of wear and character of repair required, automatic rifles are divided into categories according to the "Instructions for Classifying Artillery Materiel."

29. DAILY INSPECTION OF THE AUTOMATIC RIFLE BY THE SOLDIER

The rifle is inspected daily before leaving for a detail, before exercises, before firing, after firing, upon returning from a detail, and while cleaning.

The rifle is inspected daily in the assembled form, and in the assembled and disassembled forms while cleaning. The accessories are inspected before each cleaning. The soldier is required to report immediately to his commander (squad leader) when he discovers irregularities in his inspection of the rifle, magazines, and accessories.

The following points are checked in the daily inspection of the rifle:

Metal parts for rust, dirt, deep scratches and cracks (particular attention is to be paid to cleanliness of the chamber, bore, and bolt face).

The stock (of automatic rifles with wooden butt), fore end, hand guard and pistol grip, for cracks, splits, or serious indentations.

The bolt, operating rod, return and firing and trigger mechanisms, for proper operation when the selector is set for semiautomatic and automatic fire; magazine lock, stock catch (of automatic rifles with folding metal stock), selector indicator, for condition; end screws and rear swivel screws (of automatic rifles with wooden stock) for looseness.

The hammer, to see that it is not cocked, and the position of the safety.

The front sight and rear sight, for condition, and the rear sight leaf notch for cleanliness.

Presence of accessories in stock recess; butt plate cover (of automatic rifles with wooden stock) to see that it closes properly; presence and condition of accessories in magazine bag (of automatic rifles with folding metal stock).

The sling for proper connection.

The magazines for proper assembly and functioning, and the position of the magazine in the rifle.

30. INSPECTION OF THE AUTOMATIC RIFLE, ASSEMBLED

The rifles are inspected in the assembled form in all phases of inspection.

The following items are checked in inspecting the rifle:

Serial number on the receiver cover and serial number on receiver for correspondence.

Metal parts for rust, scratches, dents and cracks, and fore end, hand guard, pistol grip and butt, for cracks, slits, and deep nicks.

End screws, pistol grip screw, and also lower swivel and butt plate screws (of rifles with wooden butt).

Receiver and receiver cover, for cracks and deep dents. In addition, during inspection the general condition of the rifle is checked.

The front sight should be vertical and should not move in the stud holes during fire, and the front sight stud should not move in the base by pressure of the hand; the line on the stud should coincide with the line on the front sight base.

The barrel bushing should be held firmly by the lock; the lock should be depressed in the recess of the front sight base easily by hand and should return quickly under the action of its spring.

The gas tube with hand guard and fore end should not have any longitudinal play.

The rear sight base should be held firmly on the barrel. Longitudinal play of the sight leaf is permitted under the condition that the sight leaf return to the initial position after being moved to the side by hand.

The sight leaf should return to the initial position under action of the spring from any position within the limits of 30 degrees with respect to the rear sight base.

The lines and figures on the sight leaf should be clearly legible. When the catch is depressed, the slide should move freely along the entire length of the sight leaf.

The slide catch should be depressed easily into the slide recess without jamming and should return quickly to the initial position under the action of its spring.

The lock spring should firmly lock the slide at any graduation on the sight leaf.

The sight leaf notch should be without nicks and burrs.

The lock should firmly hold the gas tube and hand guard and should lock itself in the closed position.

The receiver cover should be firmly held by the guide rear face lug, and the rear face should move forward freely when its lug is pressed by the finger, and should move to the rear quickly under the action of the return spring when the lug is released.

The pins of the full automatic sear, hammer, and trigger should be held firmly in their holes.

The selector should rotate freely when changed from one position to the other, and should be firmly held in any one of the following positions: semiautomatic, full automatic, and safety.

When the selector is set on safety, and the hammer is released from the top position, the trigger should not rotate when depressed, and the operating rod should be limited in its rearward movement by the hammer.

When the selector is set on safety, and the hammer is cocked, the trigger should not rotate when depressed, and rearward motion of the operating rod should be limited by the selector indicator, the forward end of which should butt against the cocking handle.

The magazine lock should rotate easily on its pin when its lower end is pressed and should return to the original position quickly under the action of the spring; the magazine lock should firmly hold the magazine in the receiver.

The catch should not be bent, and its upper face should not be damaged by dents. The ends of the catch pin should be flattened out, and the pin should be held firmly in the hole.

The wooden butt should not have any cracks, splits, or deep dents. Between the faces of the clamp and the butt there should be a clearance.

There should be no play of the butt in the clamp, and also in the receiver.

The end screws, swivel screws, and butt plate screws should be screwed in as far as possible.

The butt plate cover should seal the recess for the accessories firmly, and should open easily without effort by the pressure of the finger. When the butt plate cover is closed, the accessory case should be pressed tightly against the cover. When the cover is open, the accessory case should be ejected quickly by its spring to be removed by the hand.

The accessory case spring should be held firmly in the recess and should not fall out when the rifle is manipulated (when the accessory case is not in the butt).

The folding metal stock should not have bent bars, and the swivel ring should be held firmly in the swivel base and should not be bent.

A small amount of lateral play of the stock and also a small amount of play of the lower ring of the shoulder support with respect to the axis of rotation is permitted. The shoulder support should rotate easily on its pins by pressure of the hand and lock firmly in the service position.

The ends of the shoulder support pins should be flattened out and held firmly in the lugs of the bars.

The stock catch should lock the butt firmly in the service and travel positions.

When the stock is moved to prepare the rifle for the service or the travel position, the bars should rotate easily by pressure of the hand and should not be caught by the protruding parts of the rifle (magazine, fore end, and selector).

The pistol grip should be held firmly on its base without play, and should have no cracks or deep dents.

Thr firing and trigger mechanism should be checked for proper operation.

Set the selector on semiautomatic fire, depress the trigger and, holding the hammer in the depressed position, pull the operating rod to the rear and release it; the hammer should not be released from the cocked position; release the trigger; a click should be heard when the latter is done (caused by the hammer moving from the semiautomatic fire position to the cocked position); when the trigger is depressed once more, there should be heard another click (hammer striking the firing pin).

Set the selector on full automatic fire, pull the operating rod to the rear and release it. The operating rod should move to the rear freely and quickly return to the forward position under the action of the return spring; when the trigger is depressed, the hammer should quickly strike the firing pin. Without releasing the trigger, pull the operating rod to the rear and slowly return it to the forward position, while holding it with the hand; when the operating rod is a distance of 3 to 6 mm from the extreme forward position, the full automatic disconnector should rotate the full automatic sear, and the hammer should quickly strike the firing pin.

Check the operation of the bolt, operating rod, return mechanism, using a magazine which is filled with drill rounds.

The operating rod should move to the rear easily without jamming and irregular motions, and move forward quickly under the action of the return spring, and at the same time the bolt should grasp the next drill round and feed it into the chamber; the next round in the magazine should be raised to the stop in the lower round portion of the operating rod lug. When the bolt approaches the barrel, the extractor lug should pass over the cartridge case flange. When the operating rod is pulled to the rear a second time, the round, striking the ejector, should be ejected and extracted from the receiver, and the next round should be fed under the flanges of the feed mechanism.

If the operating rod is pulled to the extreme rear position and moved upward vertically, it should press against the guide of the return spring; if the operating rod is released in this position, it should return quickly to the forward position under the action of the return spring without jamming.

31. INSPECTION OF AUTOMATIC RIFLE, DISASSEMBLED

The rifles are inspected in the disassembled form in the presence of an officer.

In such an inspection, all the parts must be cleaned and dried thoroughly, paying particular attention to the cleanliness of the bore.

In the inspection, particular attention must be paid to see that the receiver, receiver cover, operating rod, bolt and return mechanism all bear the same serial number. The firing and trigger mechanism is not disassembled for this inspection.

Inspection of the Barrel, Gas Cylinder, and Fore End Band

The breech and muzzle faces of the barrel, and the extractor notch, should be clean; no dents are permitted on them.

To inspect the bore, the barrel is raised to the level of the eyes and directed at a source of light; the barrel is inspected through the breech end and through the muzzle end; then the chamber is inspected. The barrel must be rotated when the bore is being inspected.

The barrel should be held at a distance of 50 to 70 mm for best visibility.

The following may be discovered when inspecting the bore:

Rust in various places along the entire bore. If rust is present, a dark deposit can be seen on the cleaning patch.

Coppering, which appears as a result of extensive firing and insufficient cleaning; it is observed in the form of a copper deposit on the surface of the bore.

Wear of the lands, which occurs most often at the origin of the rifling and at the muzzle.

Bulged barrel, which occurs in the bore in the form of a transverse dark ring; in this case the serviceability of the rifle is decided by the chief of artillery armament of the unit.

Bending of the barrel, which is determined by improper position of the shadow in the bore (fig. 87).

In order to determine bending of the barrel, the barrel is brought under any horizontal lower edge of an object (window ledge, board, etc.). In a straight barrel there should be seen a shadow in the form of an equilateral triangle, the base of which is located in the center of the bore; the shape of the triangle should not change when the barrel is rotated.

In a bent barrel, the sides of the triangle are curved and their curvature changes with rotation of the barrel about its axis. If the bending is acute, the shadow triangle is broken, or its sides are displaced with respect to each other.

Wear of the barrel bore is checked by gage K-2, which should not enter the bore through the muzzle face a distance greater than 7.62 mm. This distance may be exceeded only under the condition that the rifle satisfies the requirements for accuracy in firing.

The bore is chrome-plated. Chrome-plated barrels have a number of peculiarities which do not affect the properties of the rifle in any adverse manner.

These peculiarities are a dull bore surface and a circular darkening of the bore, spiral formations, erosion patterns, and flaking of the chromium. The dull surface, circular darkening and spiral formations may be found in new barrels as well as used barrels.

The dull bore surface is characterized by a local darkening of the bore which is not any form of rust.

The circular darkening may be formed in the entire circumference of the bore or a part of the circumference, but in the chrome-plated barrel this is not bulging and is not considered a defect.

Spiral formations on the chrome-plated bore occur as a result of mechanical finishing of the bore (in manufacture). Before the chrome-plating process, the results of the polishing process are not visible; after the chrome-plating process, the results of polishing are seen in greater relief in the form of these spiral formations.

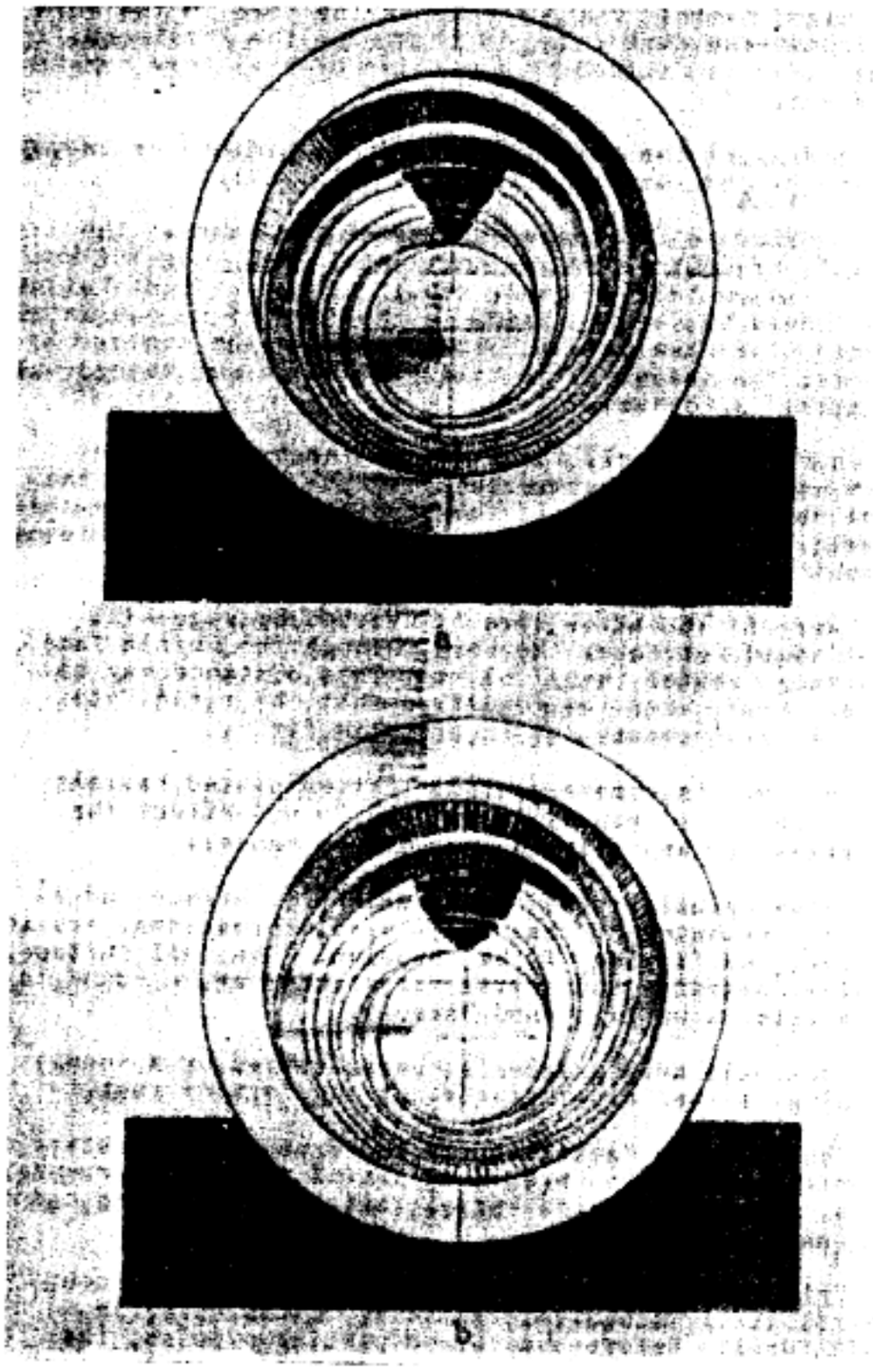

Figure 87. Triangular shadow in the base.

A. In straight barrel; B. In bent barrel.

An erosion pattern is observed in the form of intersecting stripes on the surface of the bore, as a rule in the breech end. These stripes appear as the weapon is in use. With an increase in the number of rounds fired, there are cracks formed in the stripes and chipping of the chromium takes place, first in the form of points and then in the form of slivers of chromium.

Chipping off of chromium is the most obvious form of erosion of the chrome-plated surface in the breech and occurs as a result of intense erosion.

The erosion patterns and chipping off of chromium are unavoidable in chrome-plated barrels, and cannot be considered a shortcoming of the bore, since with their appearance the barrel retains its accuracy of fire.

Bores with an erosion pattern require more intensive cleaning.

The gas cylinder should not have rust, erosion, burrs, or dents on the guide face, or nicks in the lug for attaching the cleaning rod.

The fore end band should not be bent, and the hole for passing the cleaning rod should not have any nicks; the lock should rotate freely by effort of the hand; the band should move freely along the barrel when the lock indicator is rotated forward, and should be held firmly on the barrel without play when the indicator is rotated to the rear.

Inspection of the Receiver and Receiver Cover

The receiver should not have cracks, dents, deep scratches, nicks, burrs, and raised points of metal in the guides for the operating rod, the guides for the bolt, rear face of the cam surface, screw bevel of the cam surface, and the locking lugs. In the ejector there should not be dents, cracks, or irregular portions of metal.

The trigger guard and pistol grip base should be held firmly; the rivets must not lose their grip.

The receiver cover should not have cracks, dents, or nicks in the walls of the ejection and cocking handle port.

The forward face of the receiver cover should require a certain amount of effort to be inserted in the semicircular groove in the rear sight base.

Inspection of the Bolt, Operating Rod, and Return Mechanism

In the bolt there should be no cracks, dents, chips, or raised portions of metal, especially in the locking and guide lugs.

A certain amount of erosion of the bolt face around the hole for the firing pin head is permitted. The firing pin should move in the bolt under the action of its own weight; when the firing pin is moved forward as far as possible, its rear face should not project beyond the rear face of the bolt, and when it is moved to the rear as far as possible, the tip should not project beyond the base of the bolt face.

Under the action of the spring, the extractor should quickly strike the center of the bolt face with its lug; the drill round, inserted into the bolt face, should press against the face rim with the ejector and be held firmly in the bolt.

There should be no cracks or chipping of metal in the extractor lug. The extractor spring should not be damaged and should have no less than five coils.

The extractor pin should be inserted into the hole freely by the effort of the hand and should be held firmly in it by the pin of the firing pin.

The firing pin retaining pin should be held firmly in the hole.

The operating rod should not have cracks, dents, burrs, and chipping of metal, especially in the guide grooves, the full automatic sear selector, the rear face lug, and the walls of the cam surface.

When connected with the operating rod, the gas piston rod may have a small amount of free play; the gas piston rod pin should be held firmly in the hole in the operating rod, and the ends of the pin should be flattened out (peened) and smooth.

The gas piston should have no dents, burrs, chipping or raised portions of metal (especially in the forward face).

The return spring should have not less than 80 coils; it should move freely on the guide tube and the guide rod without jamming until the coils come into contact. In the guide tube there should be no dents and burrs, and the guide rod should not be bent. The return spring with guide tube and rod should be easily inserted into the operating rod channel and be firmly held by the guide tube rear face in the grooves of the receiver rear plate.

Inspection of the Firing and Trigger Mechanism and Check of Operation

The trigger should rotate freely on its pins and the tail should not be bent; cracks and burrs on the cock notch are not permitted.

The hammer should have no dents, chipping, or noticeable rounding on the cock notch and full automatic sear notch. The full automatic sear should have no dents, chipping or rounding of the sear, and the upper end of the full automatic sear lever should not be bent or have any dents.

The disconnector should have no chipping or rounding off of its lug; under the action of the spring, the sear should rotate quickly on its axis.

The selector should be held firmly in any of its three positions, and should have no cracks, dents, or burrs in the forward end of the indicator or rounding off of the lock.

After inspection of the firing and trigger mechanism, it is necessary to check its operation.

Operation is checked as follows:

1. Release the hammer: bring back the upper end of the full automatic sear lever using a punch or wooden rod, and then press the trigger; the hammer should be released and rotate on its axis under the action of the hammer and trigger spring.

2. Set the selector on safety. The lug on the lever should be located above the right rear shoulder of the trigger and above the tail of the disconnector and should firmly limit their rotation on the pin. When the hammer is cocked, the hammer should not engage the full automatic sear of the trigger cock notch, but should butt against the semiautomatic sear with the rounded portion of its head.

3. Set the selector on semiautomatic fire. The lug on the selector lever should move to the rear the amount necessary to prevent rotation of the trigger and the disconnector.

Press the trigger. Rotate the hammer to the rear as far as possible with the hand, and the hammer should engage the disconnector. The disconnector lug should engage the notch a distance not greater than 1.8 mm.

Release the trigger; the hammer should be released and engage the full automatic sear. Bring back up the upper end of the full automatic lever using a punch or wooden rod; the hammer should disengage from the full automatic sear and engage the semiautomatic sear.

Press the trigger; the hammer should disengage from the semiautomatic sear and quickly rotate on its pin.

4. Set the selector on full automatic. The lug on the selector base should move to the rear enough so as not to interfere with rotation of the trigger; it should be located above the disconnector tail (but should not butt against it until the trigger is pressed) and firmly limit rotation of the disconnector when the trigger is pressed. Press the trigger. Rotate the hammer to the rear; the hammer should engage the full automatic sear. Without releasing pressure from the trigger, move forward the upper end of the full automatic sear lever, using a punch or wooden rod; the hammer should be released from the full automatic sear and rotate quickly on its pin.

When the full automatic sear lever is moved forward, between the full automatic sear and the full automatic sear notch there should be a clearance sufficient to permit free rotation of the hammer.

When the trigger is depressed, between the disconnector notch and the disconnector there should be a clearance of not less than 0.5 mm. When the selector is set either on full or semiautomatic fire, the hammer should be firmly held by the full automatic sear notch until the full automatic sear lever rotates forward and its upper end is set on the level of the right guide of the bolt.

In addition, when the firing and trigger mechanism is assembled, between the full automatic sear lever and the right wall of the receiver, there should be a clearance of not less than 0.2 mm; the pins of the trigger, hammer, and full automatic sear should be firmly held by the stop end of the full automatic sear spring and should not leave their holes when pressed by a punch; the ends of the pins must not butt against the right wall of the receiver.

Inspection of the Gas Tube with Hand Guard and Fore End

The hand guard bands should be held firmly on the gas tube.

The interior surface of the hand guard should have no cracks, splits or deep dents; it should be held firmly on the gas tube; between faces of the flanges of the band and the hand guard there should be a clearance of not less than 0.1 mm.

The inside surface of the fore end should have no cracks, splits or deep dents; between the fore end and the fore end band flange there should be a clearance of not less than 0.1 mm.

There should be a clearance between the hand guard and fore end.

32. INSPECTION OF THE MAGAZINE

The walls of the magazine body and the feed mechanism flanges should not be damaged or bent and also should not have any cracks.

The magazine cover plate should attach easily to the magazine body; the stop plate should hold the magazine cover plate firmly.

The magazine catch and magazine stop should not be excessively worn, and should not be dented.

33. INSPECTION OF THE ACCESSORIES

The cleaning rod should be easy to remove and replace from the recess in the fore end. The cleaning rod should be straight; the cleaning rod is checked for straightness by raising it to the level of the eyes and rotating it; the thread for the jag should not be damaged.

The screw-driver should not be dented or chipped; the blade should always be inserted so that it corresponds to the notches in the screw.

The front sight key should have no dents or burrs in the notch for the front sight. The punch should be straight; in addition, there should be no burrs on the end of the punch.

The jag should screw onto the threated end of the cleaning rod easily and be held firmly.

The shaft of the brush should be straight, clean and even; the bristles should be elastic; the brush should screw easily onto the threaded end of the cleaning rod.

There should be no dents in the accessory case. The holes in the accessory case for the cleaning rod should not be worn.

The accessories should fit easily in the accessory case.

There should be no dents or cracks in the oil can; the oil can caps should have cork washers and should screw tightly onto the can; oil must not leak through the oil can caps, or through the oil can seams.

The magazine bag should be clean, and should have all the buttons, hooks, and hinges.

PART TWO

FIELD SERVICE AND USE OF THE AUTOMATIC RIFLE

CHAPTER 5

PREPARATION OF THE RIFLE FOR FIRE AND HANDLING OF THE RIFLE

34. GENERAL

If properly prepared for fire, the automatic rifle rarely malfunctions.

The automatic rifle is prepared for fire for the purpose of insuring faultless operation in fire and maintaining accuracy.

The following must be done to prepare the automatic rifle for fire:

1. Inspect the rifle disassembled.

2. Inspect the rifle assembled.

3. Inspect the ammunition and load the magazines.

4. After inspection, check operation of the mechanisms of the rifle in the assembled form.

Irregularities discovered in inspection must be immediately reported to the commander, and the rifle must be sent to the repair shop if necessary.

In preparation for fire, loaded magazines are not to be inserted in the rifle. Magazines which are loaded with service ammunition are to be inserted in the rifle only on the firing line. Before fire, the bore and chamber must be dried thoroughly.

After fire, the rifle is to be inspected carefully for the presence of a round.

A rifle with loaded magazine is not to be left on the firing line.

It is forbidden to practice aiming, uniform squeezing of the trigger together with pulling the bolt to the rear and releasing the hammer without drill rounds in the magazine or chamber.

35. PREPARATION OF THE AUTOMATIC RIFLE FOR FIRE

In preparing the rifle for fire, it is necessary to consider the time of year and the temperature at which the rifle will be fired. Depending upon these considerations, the proper lubrication must be used.

In preparing the rifle at temperatures of plus 50 degrees C. to minus 5 degrees C. (122°F to 23°F), it is necessary to field strip the rifle, carefully inspect, clean and lubricate the rifle with rifle lubricating oil. Then assemble the rifle and check the operation of the assembled rifle.

In preparing the rifle for fire at temperatures lower than minus 5 degrees C. (23°F), the rifle is to be detail stripped, and all parts are to be wiped dry, paying particular attention to the parts of the firing and trigger mechanism, bolt, and magazine.

Then all the parts of the rifle are to be lubricated lightly with winter lubrication No. Zl. Grooves, holes and notches are to be lubricated with a patch which is immersed in oil and wound on the wooden rod. Then the rifle is assembled. The winter lubrication must be applied evenly and in a thin layer.

When the rifle is being prepared for fire after the first lubrication, if the parts of the rifle are not excessively dirty, it is necessary to field strip the rifle, clean them, and again apply winter lubrication.

If the rifle is not used at all, or used seldom, then the instructions given in Chapter 8, Section 49, are to be followed. When rifles are received with storage or factory lubrication, it is necessary to detail strip the rifles and magazines, remove all the lubrication, and then apply the proper lubrications to the parts, depending upon the temperature in which the rifle will be employed.

NOTE: The firing and trigger mechanism of automatic rifles with stamped receiver is not disassembled for cleaning. It is cleaned and lubricated in the assembled form.

36. LOADING THE MAGAZINE

Before the magazine is loaded, it must be inspected, cleaned and lubricated with the proper lubrication.

The rounds must be inspected before a magazine is loaded. It is forbidden to load magazines with defective rounds, either service or training. The magazine is loaded in the following

manner; Grasp the magazine with the left hand, follower upward, and with the right hand insert the rounds into the feed mechanism of the magazine, and, using the thumb of the left hand, force them into the magazine (fig. 88).

37. LOADING THE RIFLE

To load the rifle, follow these instructions:

1. Attach the loaded magazine to the rifle; this is done by inserting the magazine into the receiver hole and, pressing the magazine upward, rotate it to the rear as far as possible, until a click is heard indicating that the magazine catch is engaged by the magazine stop. The magazine is then rocked to check the hold of the catch.

2. Clear the opening for the cocking handle by rotating the selector indicator, and set the selector on the required fire setting, matching the end of the selector with the corresponding setting on the receiver.

3. Bring the operating rod to the rear as far as possible by means of the cocking handle and release it; the rifle is now ready to fire.

38. SETTING THE SIGHTS

To set the sight on the required graduation, press the slide catch, move the slide until it matches the required graduation on the sight leaf; release the slide catch.

The battle setting (indicated by the letter P) is used in concentrated periods of combat, when time does not permit setting the slide. This setting permits the destruction of targets up to 50 cm in height (chest target) at ranges up to 350 m; at ranges up to 300 m, it is necessary to aim at the lower edge of the target, and at ranges greater than 300 m the rifle must be aimed at the center of the target.

In firing at a range greater than 350 m, or when it is necessary to effect more accurate fire, it is necessary to set the slide on the graduation of the sight leaf that corresponds to the range to the target.

39. FIRING

The following is performed in firing:

Set the rear sight on the required range.

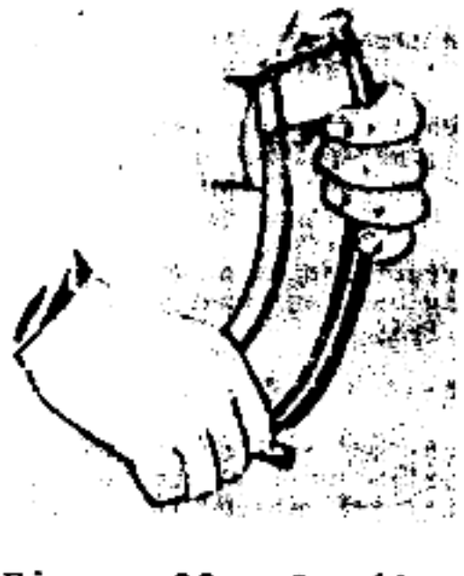

Figure 88. Loading the magazine.

Prepare for fire; in firing the rifle, the rifle is held by gripping the fore end ahead of the magazine with the left hand or gripping the magazine, and the pistol grip is held by the right hand.

Take aim and squeeze the trigger smoothly.

If the selector is set on automatic fire, the rifle will keep firing as long as the trigger is depressed and rounds remain in the magazine.

If the selector is set on semiautomatic fire, only one shot will be fired when the trigger is pressed. To fire the rifle, it is necessary to squeeze and release the trigger every time.

40. CHANGING THE MAGAZINE

To change the magazine: Remove the magazine from the rifle; remove a loaded magazine from the magazine bag; place the empty magazine into the magazine bag; attach the loaded magazine to the rifle.

41. CESSATION OF FIRE AND PREPARING THE RIFLE FOR FURTHER FIRE

The rifle can cease firing due to:

1. Failure of the mechanisms. To eliminate the cause, follow the instructions in Chapter 6, Section 45.

2. Absence of rounds in the magazine. To continue firing, it is necessary to reload the rifle.

3. Command to cease fire or accomplishment of mission.

To cease fire, it is necessary to release pressure from the trigger; in this case the operating rod remains in the forward position, a round will be in the chamber, and the hammer will be cocked. The rifle is ready for further firing.

42. SETTING THE RIFLE ON SAFETY

When firing is not being conducted (after cessation of fire, in travel and training, and also when the rifle is stacked) the rifle must be set on safety.

To set the rifle on safety, the selector indicator must be turned upward as far as possible.

If the rifle is unloaded, before the selector is set on safety, the hammer must be released.

43. UNLOADING THE RIFLE

To unload the rifle:

Detach the magazine from the rifle.

Remove the round in the chamber, pulling to the rear the operating rod using the hand.

Release the hammer by pressing the trigger.

Set the rifle on safety.

Set the rear sight on battle setting by pulling the slide to the rear as far as possible.

CHAPTER 6

CAUSES OF FAILURE OF THE RIFLE

44. GENERAL PROCEDURE FOR PREVENTING AND ELIMINATING STOPPAGES

With proper maintenance, storage and handling, the automatic rifle is reliable in use. However, as a result of careless handling, dirty parts, low-grade rounds, and also as a result of wear of the parts caused by extensive use, normal operation of the rifle can be affected, causing stoppages during fire. The majority of stoppages can be easily eliminated simply by cocking the rifle, that is by bringing to the rear the operating rod and releasing it.

To prevent stoppages:

1. Prepare the rifle for firing properly.

2. Inspect, clean and lubricate the rifle.

3. Carefully observe the cleanliness and operation of the operating rod, bolt, bore, gas channels and magazines.

4. Perform timely maintenance.

5. Carefully inspect ammunition before firing.

6. Fire only serviceable and clean ammunition.

7. Protect the rifle from dirt and blows during fire and travel.

8. In combat, clean the gas port in the barrel, the gas tube, and the piston, and lubricate lightly the working surfaces of the parts, at every possible opportunity.

9. Disassemble and clean the rifle whenever it is excessively dirty. If the rifle is used in extremely cold weather a considerable period of time, before loading it is necessary to move the operating rod forward and rearward several times manually.

If a stoppage occurs in fire, recock the rifle immediately manually and continue firing; if recocking the rifle does not eliminate the stoppage, it is necessary to ascertain the cause and eliminate the stoppage.

45. CHARACTERISTIC MALFUNCTIONS AND METHODS FOR CLEARING THEM

A list of the most common malfunctions is given in the following table, together with the general causes of the malfunctions and the simplest methods that may be employed to clear them.

Malfunction	Causes	To clear
1. Failure of magazine to feed rounds. The moving parts move to the extreme forward position, the round is not fired, and there is no round in the chamber.	Magazine not properly attached. Dirty or defective magazine. Defective magazine catch.	Recock the rifle and continue fire; if the malfunction occurs again, replace the magazine. If the magazine catch is defective, send the rifle to the repair shop.
2. Empty cartridge case not extracted from chamber. Cartridge case remains in chamber, the following round jams against the cartridge case. Moving parts remain in center position.	Dirty rounds or chamber. Defective extractor or weak extractor spring.	Cock rifle and remove cartridge case from chamber with cleaning rod. Clean rounds and chamber, and inspect extractor. If extractor is serviceable, continue firing. If extractor is unserviceable, send rifle to repair shop.
3. Jamming of cartridge case. Cartridge case not extracted from receiver, but is jammed between bolt and barrel, or between bolt and receiver, or is rammed back into chamber.	Dirty moving parts, gas port or chamber. Defective extractor or extractor spring.	Pull bolt to rear, extract jammed cartridge case and continue firing. Clean and lubricate rifle at first opportunity. If extractor or extractor spring is defective, send rifle to repair shop.

Malfunction	Causes	To clear
4. Jamming of round. The bullet end of the round jams against the barrel as the bullet moves forward.	Excessive play of magazine, bent magazine flanges.	Pull operating rod to the rear and, retaining it by means of the cocking handle, remove the jammed round and continue firing. If jamming occurs again, replace magazine.
5. Misfire. Bolt in forward position, hammer released, but round not fired.	If the primer shows deep dents caused by firing pin, primer is defective. If slight dent is found in primer, defect lies in firing pin or firing and trigger mechanism.	Recock rifle and continue firing. If stoppage occurs often, inspect and clean firing pin and firing and trigger mechanism. Pay particular attention to full automatic sear. If parts are broken or defective, send rifle to repair shop.

CHAPTER 7

CHECK OF ACCURACY AND ADJUSTMENT OF AUTOMATIC RIFLE

46. PROCEDURE FOR ADJUSTING RIFLE

The accuracy is checked:

1. When the rifles arrive at the using units;

2. After replacing the front sight or after repair of the rifle;

3. When abnormal fire dispersion is discovered during fire.

The best riflemen of the unit must be selected to fire the rifles for the purpose of checking accuracy. The riflemen are detailed by the company commanders. The rifles are fired in the presence of the soldiers to whom the rifles are assigned, and in the presence of their commanders.

Before firing for testing accuracy, the rifle must be carefully inspected and all defects must be eliminated. The armorer-artificer must be present at the firing range.

Firing for testing accuracy must be performed under favorable conditions: in clear, calm weather, in a protected rifle range, or on a portion of a rifle range which is protected from the wind. The rifles are fired for accuracy using ball ammunition at a range of 100 m with the rear sight set on graduation 3.

The target in this case is a black rectangle 35 cm high and 25 cm wide, fastened on a white board 1 m high and 0.5 m wide. The aiming point is the center of the lower edge of the rectangle; it should be located approximately at the height of the head of the soldier firing the rifle. A point located above the aiming point on the vertical line which characterizes the normal position of the center of the impact, which should be above the aiming point by 28 cm, is marked using chalk or pencil.

The point thus marked is the control point.

The rifle is fired in the prone position using a support. The support may be a bag which is filled with sawdust, earth, or sand.

In this position, the left arm of the rifleman, which is supporting the rifle, should be on top of the support.

Figure 89. Determination of center of impact by the graphical method.

I - measurement of four holes; II and III - measurement of four symmetrically located holes.

Four single shots are fired while carefully and uniformly aiming at the lower edge of the black rectangle, and the position of the rifleman's body and left hand must not change.

When fire ceases, the commander inspects the target and determines the accuracy of the rifle and the position of the center of impact on the basis of the location of the bullet holes. The accuracy of the rifle is considered to be acceptable if all four bullet holes, or at least three holes, if the fourth hole is located quite a distance away from the remaining holes, are grouped in a circle with a diameter of 15 cm, and if the center of impact deviates from the control point no greater than 5 cm in any direction.

If the accuracy does not satisfy this condition, the company commander must inspect the rifle, check the sight setting, and repeat the fire. If an unsatisfactory result is obtained the second time, the rifle is sent to the repair shop for ascertaining and eliminating the causes of inaccuracy.

If the accuracy of the rifle is considered normal, the commander determines the center of impact and its position with respect to the control point.

To determine the center of impact from the four bullet holes (fig. 89):

1. Connect any two bullet holes with a straight line and find the center of the distance between them.

2. Connect the points thus obtained with the third hole, and divide the distance between them into three equal parts.

3. Connect the point of division closest to the two first holes with the fourth hole, and divide the distance between them into four equal parts. The point which is located three divisions from the fourth hole is the center of impact.

If the bullet holes are located symmetrically, the center of impact may be determined by one of the following two methods:

1. Connect the bullet holes located closest together; the centers of both straight lines are to be connected with the third line, and the line thus obtained is to be divided in half; the dividing point is the center of impact.

2. The bullet holes are connected with intersecting straight lines; the intersection of these lines is the center of impact.

If one of the holes is located a large distance from the remaining holes, it is not considered, and the center of impact is determined from the three holes.

In this method, two holes are connected by a straight line, the center of this line is connected with the third hole, and the new line is divided into three equal parts; the point located two divisions from the third hole is the center of impact.

The center of impact should coincide with the control point or deviate from it no more than 5 cm in any direction.

If the center of impact deviates more than 5 cm from the control point, the armorer-artificer adjusts the rifle by moving the front sight to the right or left or up and down, depending upon the direction in which the center of impact deviates.

It must be borne in mind that the front sight must be moved in the direction in which the center of impact deviates.

If the center of impact deviates to the left of the control point, the front sight must be moved to the left; if deviation is up, the front sight must also be moved up (using screw-driver).

The amount of displacement of the front sight is determined by multiplying the amount of deviation of the center of impact from the control point as measured on the target by the correction factor.

The correction factor for the AK automatic rifle with given conditions (range to target 100 m, range setting 3, length of sighting line 378 mm) is 0.0378.

EXAMPLES:

1. The center of impact deviates from the control point to the right by 12 cm, and 10 cm low.

In order for the center of impact to coincide with the control point, the front sight must be moved to the right 0.0378 times 12 equals 0.4536 mm, is approximately equal to 0.5 mm, and low by 0.0378 times 10 equals 0.378 mm, is approximately equal to 0.4 mm.

2. The center of impact deviates from the control point to the left 19 cm and 15 cm up. The front sight must be moved to the left 0.0378 times 19 equals 0.7182 mm, approximately equal to 0.7 mm, and up 0.0378 times 15 equals 0.5670 mm, approximately equal to 0.6 mm.

NOTE: The amount of deviation of center of impact in cm is multiplied by the correction factor and the result is obtained in mm.

After the position of the front sight is corrected, the rifle is checked for accuracy once more.

Moving the front sight laterally one millimeter displaces the center of impact by 26 cm at a range of 100 m; screwing in (screwing out) the front sight the amount of one turn raises (lowers) the center of impact 20 cm. When the rifle is adjusted, a new graduation line is entered on the front sight slide and the old graduation line is obliterated.

It is forbidden to obliterate graduation lines in the base of the front sight.

After the rifle is adjusted, the results and time of accuracy check are entered into the gun data card of the rifle (see Appendix II).

47. CHARACTERISTIC DEFECTS OF THE RIFLE AFFECTING ACCURACY

Deviation of the center of impact during fire can be caused by the following causes:

1. Rear sight leaf bent causing the bullets to deviate in the direction in which the sight is bent; the rifle must be sent to the repair shop and rechecked for accuracy after repair.

2. Front sight slide displaced to the side, causing the center of impact to deviate in the direction opposite that of the displacement of the slide (displacement of the slide is determined by the position of the alinement lines on the slide and the front sight base); the front sight slide is set even with the line on the front sight base and then the rifle is checked for accuracy.

3. Front sight slide insecurely installed; the rifle must be sent to the repair shop.

4. Loosening of the front sight; in this case, the center of impact will be deviating in the direction opposite that of the sight displacement (upward when sight unscrews and downward when sight lowers); the front sight must be removed in order to widen the leaves; if the front sight is not held firmly, it must be replaced; after all these operations, the rifle must be checked for accuracy.

Excessive dispersion may be caused by the following:

1. Large play of rear sight leaf; the notch keeps shifting when the rifle is fired to cause dispersion.

2. Muzzle face dented.

3. Excessive play of stock (of rifles with folding metal stock).

The serviceability of the rifle must be determined by careful inspections, check of caliber, and fire for accuracy, if any of the above irregularities are present.

CHAPTER 8

CLEANING AND LUBRICATION OF THE AUTOMATIC RIFLE

48. CLEANING AND LUBRICATION OF AUTOMATIC RIFLES IN USE

General

The rifle must be kept clean at all times. Cleanliness is attained by timely and proper inspection, cleaning, and lubrication. Cleaning of rifles in use in units is performed:

1. In field of combat, on maneuvers and extended training in the field--daily (a lull in combat or break in training is utilized).

2. After firing service and blank cartridges--immediately upon completing the fire; it is necessary to apply the alkali solution, wipe dry and lubricate the bore, gas cylinder, gas tube, piston and bolt immediately at the firing range (in the field); upon returning from the firing range, the rifle must be cleaned completely; cleaning must be repeated for the following three or four days.

3. After training, guard duty and exercises (even though the rifle is not fired)-- immediately after completing duty.

4. If the rifle is not fired or used--not less than once every seven days.

NOTE: It is strictly forbidden to leave alkali solution in the bore, gas cylinder, gas tube or bolt face, since this will cause rapid rusting of the metal.

The rifle is lubricated immediately after cleaning.

The rifles are cleaned and lubricated under the supervision of officers and sergeants, who must:

1. Determine the degree of disassembly, cleaning and lubrication required.

2. Check the condition of the accessories and the cleaning materials used.

3. Check the rifle for cleanliness, and then give permission to lubricate.

4. Check the lubricated rifle and give permission to assemble the rifle.

5. Check the assembled rifle and give permission to replace the rifle in the rack.

In permanent installations, the rifles are cleaned in places which are specially prepared for cleaning; in the field, the rifles are cleaned in places which are prepared by laying down boards, canvas, etc.

The materials for cleaning must be in good condition, and the lubricating materials must be of good quality. The lubricating materials must be stored in the proper cans, and the cloths in bags. Lubrication in storage must be kept in closed containers in storage buildings, and the cloth materials must be kept in special cases or must be tightly wrapped.

For cleaning, wiping and lubrication of the rifle, use a clean and soft patch and hemp fiber from which the scutch is removed. The hemp fiber is used for cleaning the bore.

To clean and lubricate the rifle, use the following lubrication and cleaning compositions:

1. Alkali solution; removes fouling from the bore and other parts of the rifle which come into contact with the gases.

2. Rifle lubricating oil; this is used for lubricating all metal parts, and is effective at a temperature of plus 50 degrees to minus 5 degrees C (122°F to 23°F).

3. Winter lubrication No. 21; this is used for lubricating rifles which are in use in winter, both in preparation for fire and in lulls in fire.

The above lubrication must not be used in summer, since it is not sufficient protection from corrosion. It is forbidden to heat lubrication No. 21, since when heated to a temperature of 80 to 100 degrees C (176°F to 212°F), it decomposes and becomes unsuitable for use.

Winter lubrication No. 21 is effective for use in the mechanisms of the rifle at a temperature of minus 5 to minus 40 degrees C (23°F to minus 40°F). At a lower temperature, from 10 to 20% of dehydrated kerosene must be added to it (diluting lubrication No. 21 with kerosene improves the operation of the mechanisms but decreases anti-corrosive properties).

4. Gun oil; used to lubricate the rifle prior to extensive storage; it is used mixed with rifle lubricating oil (50% gun oil and 50% rifle lubricating oil).

5. Kerosene of good quality which is first filtered with calcined table salt; used to remove old lubrication from rifle (after storage), for softening rust, and also for diluting winter lubrication No. 21.

Kerosene may be used only in the artillery repair shop.

It is not permitted to use any other lubrication and cleaning solutions.

The use of lubrication and cleaning solutions has a useful purpose only in the event that proper maintenance and lubrication of the rifle are performed. Without observing these conditions, the lubrication will not be effective in protecting the rifle, and in some instances incorrectly used lubrication or non-standard lubrication and solutions may cause failure of the rifle, especially at low temperatures.

Procedure for Cleaning and Lubrication

To clean the rifle after firing, exercises, classes and duty detail, the rifle must be field stripped.

The rifle must be detail stripped to remove storage lubrication, when replacing or repairing parts, when the rifle is very dirty, or after excessive exposure to moisture.

NOTE: The firing and trigger mechanism of rifles with stamped metal receiver of earlier manufacture is disassembled only when replacing or repairing parts in the artillery repair shop.

To clean the bore, the accessory case must be attached to the cleaning rod as follows:

1. Insert the cleaning rod through the large hole in the case so that its head passes inside the case and butts against its wall.

2. Insert the screw-driver into the case above the cleaning rod head.

3. Install the accessory case cap on the cleaning rod.

4. Install the jag or brush on the threaded end of the cleaning rod.

Figure 90. Cleaning rod prepared for cleaning the bore.

When using the tool as a key for removing or installing the front sight, the screw-driver blade is inserted into the notches in the accessory case (through the long notch and the short notch) (fig. 91).

When using the tool as a screw-driver, the key is inserted into the accessory case notches (through the long notch into the short notch) (fig. 92).

To clean the bore, it is necessary to form the hemp fiber into a figure eight and immerse it into the alkali solution, and install the hemp fiber on the face of the jag (see fig. 90) in such a manner that its ends do not hang further than the rotating part of the jag. Then introduce the cleaning rod into the bore through the muzzle end to a depth of approximately one third the length of the barrel; install the accessory case cap on the muzzle part of the barrel; rest the butt plate against an object (fig. 93), grasp the barrel with the left hand, and grasp the accessory case (cleaning rod handle) with the right hand, and move the cleaning rod back and forth throughout the entire length of the bore 7 to 10 times; then replace the hemp fiber with other hemp fiber saturated with alkali solution and repeat the process. Dry the bore thoroughly using a patch (after carefully wiping the cleaning rod, jag and accessory case cap) and, if there are traces of fouling or rust on the patch, repeat the cleaning using the hemp fiber saturated with alkali solution, and then use a dry white patch. Repeat this operation until a dry white patch shows no traces of fouling.

The same procedure is to be employed to clean the chamber, gas cylinder, and muzzle face. After cleaning the bore, chamber, and gas cylinder, inspect the bore through the muzzle end while rotating the rifle. To improve illumination, insert a piece of white paper into the receiver.

NOTE: A barrel in which there is an erosion pattern must be cleaned especially carefully, and all the erosion must be removed.

After the bore and chamber are cleaned, they are lubricated with a uniform thin layer of oil, using the brush dipped in rifle lubricating oil. If the brush is unsuitable, it is permitted to lubricate the bore using the patch dipped in rifle lubricating oil.

The exterior surface of the barrel (the areas under the hand guard, fore end and rear sight base) should be cleaned with a patch soaked in alkali solution and wrapped around the end of a small wooden stick.

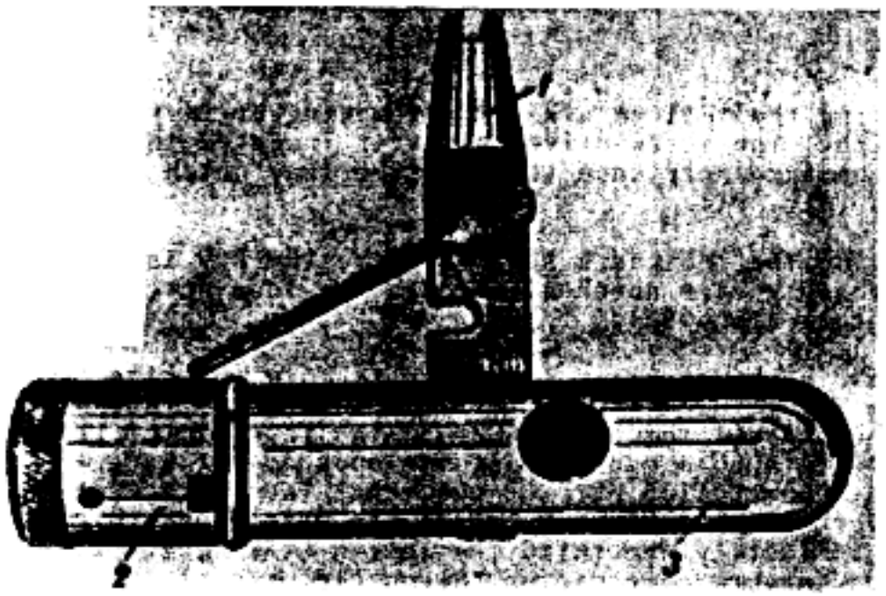

Figure 91. Combination tool prepared for removing the front sight.

1 - combination tool; 2 - accessory case cap; 3 - accessory case.

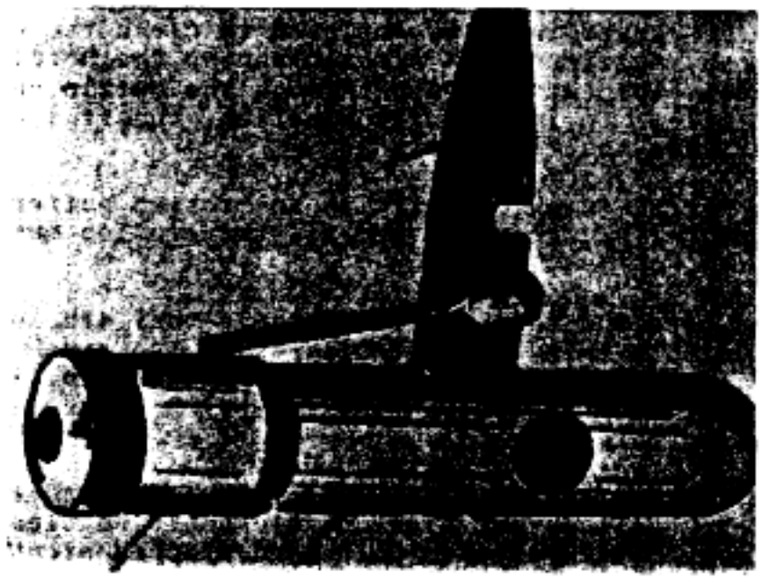

Figure 92. Combination tool prepared for removing screws.

Figure 93. Cleaning the bore.

If the rifle has been fired, the gas cylinder and gas tube should also be cleaned with a patch soaked in alkaki solution until all carbon deposits are removed, after which the parts should be dried with a patch wrapped around the wooden stick or around the jag. The gas port should be cleaned with a reamer.

After firing, the piston, the gas piston rod, bolt and operating rod are cleaned with a patch saturated with the alkali solution. It is forbidden to clean the operating rod channel in which the return mechanism is housed using the alkali solution; it must be wiped dry, using a clean patch and lubricated by applying a patch saturated with rifle lubricating oil.

If the rifle has not been fired, the gas cylinder, gas tube, piston, gas piston rod and operating rod must be wiped dry with a clean patch and lubricated.

If a hardened fouling is present in the above-indicated parts, apply the alkali solution to them and remove the solution after a period of ten to fifteen minutes; then clean and dry them thoroughly. The receiver, return mechanism, firing and trigger mechanism are wiped using a dry cloth; the holes, recesses and grooves are cleaned with a patch on the end of a sharp stick. After cleaning, the rifle parts must be covered with a thin layer of rifle lubricating oil.

NOTE: The firing and trigger mechanism and folding metal stock are not disassembled for cleaning and lubrication.

After cleaning, a check must be made that no patches are left in the gas cylinder, gas port, and operating rod channel.

It must be borne in mind that excess lubrication tends to collect dirt. In the summertime, moving parts must be lubricated more often than in winter.

The exterior surface of metal parts must first be wiped with a clean cloth and then with a cloth bearing a small amount of oil; wooden parts of the rifle are to be wiped, using only a dry cloth; it is forbidden to lubricate them with rifle lubricating oil.

To lubricate holes, recesses, and grooves, a clean patch must be wound on a wooden rod and dipped into oil.

If magazines were filled with rounds but the rifle has not been fired, wipe only the exterior surface of the magazines and apply a thin layer of lubricating oil; if the magazines were filled and the rifle was fired, the magazines must be disassembled, all the parts must be

wiped with a dry patch on the end of a sharp stick, and the feed mechanisms and followers wiped with a cloth dipped in the alkali solution, and then dried using a dry patch and coated with a thin layer of oil.

Upon completion of cleaning, the accessories must be wiped, inspected, assembled and inserted into the butt. After lubrication, the rifle is assembled, the operation of the parts in assembled form is checked, and the rifle replaced in the rack.

At low temperatures, it is advantageous to clean the rifle in a heated building. After the rifle is brought into a heated building, it is necessary to wait ten to fifteen minutes before cleaning in order for moisture to form on the rifle.

There is no necessity for waiting until the moisture formed on the rifle evaporates, since rust will form under each drop. This is especially important in the event the rifle is brought into a building for an extended period of time.

If the moisture is not carefully removed from the rifle, the rifle, when taken out into the cold, may malfunction as a result of ice formation on the parts.

Rifles which are subjected to rain or snow must be carefully cleaned. Old lubrication must be removed and fresh lubrication applied.

49. USE OF THE AUTOMATIC RIFLE IN WINTER

A rifle which is in use in winter must be lubricated using only winter lubrication in accordance with the instructions of the preceding section. It is forbidden to lubricate rifles which are not used using lubrication No. 21.

Before lubricating the rifle using winter lubrication No. 21, it is necessary to detail strip the rifle, and remove the rifle lubricating oil from all the parts and mechanisms, and then wipe them dry with a patch.

It is especially important to remove completely summer lubrication from the firing and trigger mechanism springs, the space between the full automatic sear and receiver wall, and the parts of the magazine.

The parts of the rifle must be lubricated with winter lubrication by applying a thin layer by means of a patch soaked in oil.

If the winter lubrication is applied in a thick coat, malfunctions may be caused during fire.

Lubrication No. 21 protects the metal from corrosion for only a short time (1 to 2 months). The oil cannot protect the metal for a longer period, especially in areas with high humidity and atmosphere saturated with various salts. Therefore, if the rifles are used seldom, it is necessary, not less than every 1 to 2 months, to inspect them, remove lubrication if necessary, dry the surfaces and apply fresh lubrication.

After bringing the rifle into a heated building from the cold, it must be permitted to "sweat"; the rifle must then be dried and all the parts lubricated.

If the rifle is in the cold or in snow a considerable period of time before fire, before loading the rifle it is necessary to move the operating rod back and forth several times by means of the cocking handle.

Check the position of the hammer while cocked, and pull the trigger to release the hammer from the cocked position.

50. USE OF THE AUTOMATIC RIFLE IN AREAS WITH HIGH TEMPERATURES AND SANDY TERRAIN

In training exercises, during marches and in combat in sandy terrain, it is necessary to adopt all measures for protecting the rifle and ammunition from dust.

During extensive use of the rifle in dusty terrain, the bolt and the guides in the receiver should be oiled frequently through the opening for the magazine and ejection port; the rifle need not be disassembled for this operation. Before reloading the rifle after each oiling, the functioning of the firing and trigger mechanism should be checked by pulling the operating rod to the rear and releasing it several times. In such dusty terrain, the opening in the reciever through which the magazine is inserted into the rifle should be uncovered only when changing magazines and during the periodic lubrication mentioned above. In combat, the slot for the cocking handle should be covered during lulls in fire by means of the selector cover plate, i.e., by setting the rifle on safety.

The rifle should be cleaned and lubricated after each extensive use. Special care should be taken in cleaning and oiling the working surfaces of the trigger and firing mechanism, bolt, operating rod, extractor, gas tube and magazine.

In combat, lack of time may make it permissible to fire the rifle without oiling it, but not without wiping the dust off all the parts. The rifle must be thoroughly cleaned and oiled at the first opportunity.

In hot weather, the rifle and especially the ammunition should be shielded as much as possible from the rays of the sun. Overheating of the rifle, and especially of the ammunition, may be the direct cause of stoppages.

51. CLEANING AND LUBRICATING RIFLES IN PREPARATION FOR EXTENDED STORAGE

Rifles to be cleaned in preparation for storage must be detail stripped. The usual cleaning procedures are to be observed, with special attention allotted to the removal of carbon deposits, dirt, moisture and rust from the bore, gas cylinder, gas tube, gas piston, and all grooves and holes.

To remove traces of rust and lubrication, it is suggested that the parts of the rifle be taken to an artillery repair shop and washed in kerosene, then dried thoroughly with a clean, dry patch; then lubrication must be applied immediately to protect the metal from moisture.

The dried parts must not be handled in the bare hands, since rust may form from perspiration. They must be handled using a clean patch or paper.

After being cleaned and dried, permission of the person in charge of cleaning must be obtained to lubricate the rifle.

Rifles which are to be stored for a prolonged period are to be lubricated with a mixture consisting of 50% rifle lubricating oil and 50% gun oil.

The wooden parts of the rifle are dried thoroughly and are not lubricated.

Rifles is storage (both new and used) are inspected and cleaned not less than once every two years; the oil in the bores must be changed at least once every two years, and fresh lubrication applied to exposed parts not less than twice a year (spring and fall).

CHAPTER 9

STORAGE OF AUTOMATIC RIFLES

52. STORAGE OF RIFLES IN UNITS

The rifles should always be in full combat readiness.

Storage of the rifle and its accessories is the responsibility of the soldier who must maintain the equipment properly and inspect it daily.

In permanent installations, the rifle is kept in the rack; the magazines are removed from the rifle, the hammer is not cocked, the safety is set, and the rear sight slide is set on the graduation P (pulled to the rear as far as possible).

Folding metal stocks are set in the folded position.

The magazines are stored unloaded in special compartments of the rifle rack or in cabinets. The magazine bags are stored together with the magazines.

Cleaning accessories of rifles with wooden butt are stored in the butt recesses, and the accessories of rifles with folding metal stock are stored in the magazine bags. In the camp, the rifles are stored in the rifle racks the same as in the permanent barracks.

In travel, the rifles are carried with attached but unloaded magazines, and in combat, with loaded magazines. The rifle must be set on safety. Spare magazines are carried in bags. When the troops are quartered in tents, the rifles are stored on a covering or in temporary racks. During a halt, the rifles are stored depending upon the situation, and must be protected from dirt, damage, etc.

If the troops are quartered in houses at a populated place, the rifles are stored with attached but unloaded magazines (loaded in combat) depending upon the type of building; the rifles are kept on a table, bench, or shelf, or are hung on nails or hangers by means of the sling.

In travel by railroad or water route, the rifles are kept in special places or are hung, if the situation permits.

In movement in motor vehicles, in armored carriers, the rifles are held between the knees to protect them from blows. In travel, the hammer must not be cocked, and the safety must be set.

53. STORAGE OF RIFLES IN DIVISION AND CORPS DEPOTS

As a rule, rifles which are in the reserve of the military units of corps level and lower are stored in division and corps depots.

The depots must be equipped so as to satisfy the requirements of the "Instructions for Storage and Care of Artillery Materiel and Ammunition by Using Troops."

It is not permitted to store rifles in boxes which are formed into stacks.

In rare cases, when no equipped storage places are available, rifles may be stored in boxes, but must be stored separately from the accessory equipment (slings, canvas bags, etc.) since this causes the formation of rust and deterioration of the accessory items; the permission of the Chief of the Department of Artillery Equipment of Military District (Group) must be obtained in this instance.

At the depot, the rifles are stored in rifle racks, with an individual compartment for each rifle. Before the rifles are stored in the rack, the magazines are removed, hammer released, safety set, and rear sight slide set on graduation P. The magazines are stored by the automatic rifles or on shelves; the accessories are stored in cabinets or on shelves.

Each rifle compartment is numbered. Above each rack there is a record of the automatic rifles indicating the unit to which the rifles are assigned, the rifle serial numbers, and the year of manufacture. In a box near the rifle rack are kept the data cards of the rifles with the following information entered: condition of the bore, date of assignment to unit, date and results of accuracy check, and category of rifles.

PART THREE

AMMUNITION

CHAPTER 10

SERVICE AND TRAINING AMMUNITION

54. GENERAL

The Kalashnikov automatic rifle fires the 7.62-mm round M1943.

The rounds have varying construction depending upon their purpose.

The weight of the bullets and their muzzle velocity are selected so that fire using the different bullets can be conducted with the same sight settings.

Ammunition is divided into service and auxiliary types.

55. SERVICE AMMUNITION AND ITS USE

Service ammunition is divided into ball cartridges and special purpose cartridges.

Ball ammunition is used to destroy enemy personnel.

Special ammunition, depending upon its construction, is designed for target indication and correction of fire, igniting fuel and highly inflammable objects, for destroying lightly armored targets, etc.

Tracer cartridges are designed for target indication, fire adjustment, signal purposes, and destroying personnel. Tracer bullets can ignite straw roofs, dry grass, dry leaves, etc. The path of the bullet is indicated by a red flame, which is easily seen in day or night. The flame can be seen from a distance of 800 meters.

AP-incendiary cartridges are used to ignite fuel (gasoline) and for destroying targets protected by thin armor plating at ranges of up to 300 meters.

Incendiary cartridges are used to destroy fuel (kerosene, gasoline) in iron tanks up to 3 millimeters thick, and also for igniting straw roofs, haystacks, and dry grass at ranges up to 700 meters. Incendiary cartridges also contain a tracer

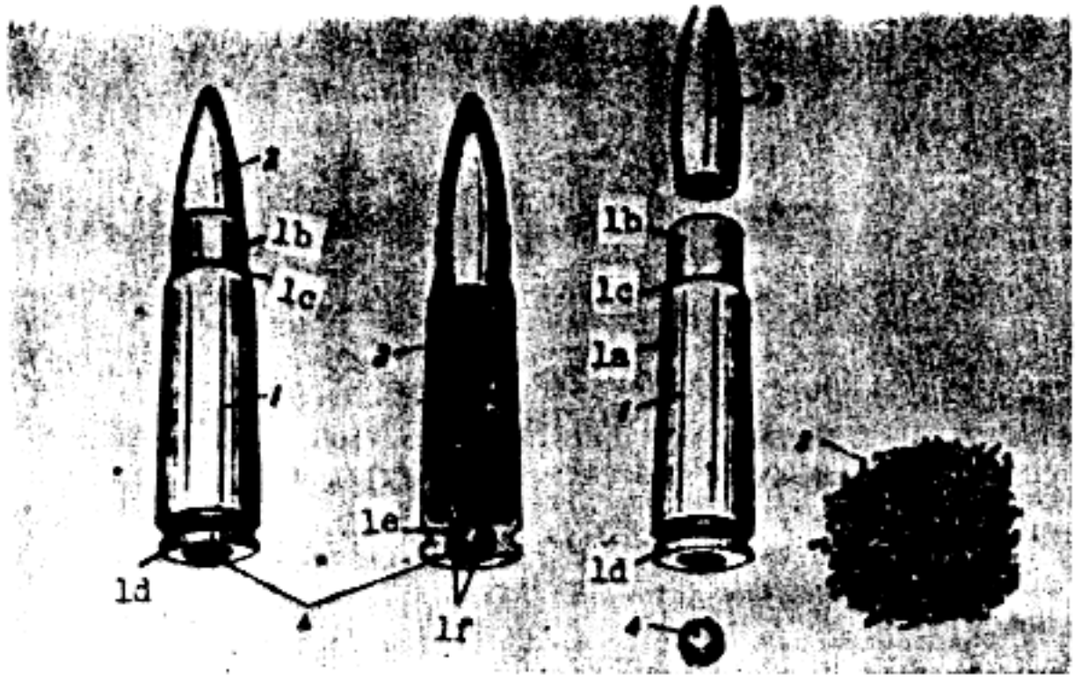

Figure 94. Service round. 1-cartridge case; 1a-body; 1b-mouth; 1c-shoulder; 1d-rim; 1e-anvil; 1f-vents; 2-bullet; 3-propellant; 4-primer.

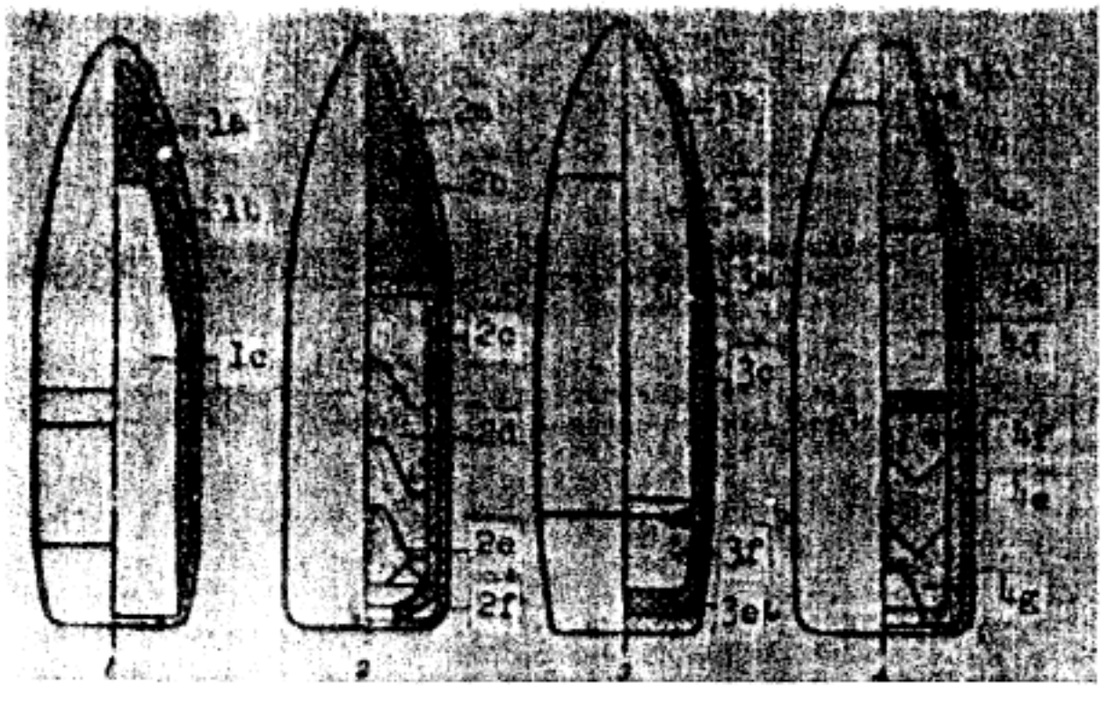

Figure 95. Bullets.

1 - bullet of ball cartridge; 1a - jacket; 1b - lead sleeve; 1c - core; 2 - tracer bullet; 2a - jacket; 2b - lead core; 2c - cup; 2d - tracer element; 2e - ignition composition; 2f - ring; 3 - AP incendiary bullet; 3a - jacket; 3b - cap; 3c - lead sleeve; 3d - core; 3e - base filler; 3f - incendiary composition; 4 - incendiary bullet; 4a - jacket; 4b - cap; 4c - lead sleeve; 4d - core; 4e - cup; 4f - tracer

element. The path of the bullet is indicated by a red flame which is easily seen in day and night. The trace can be seen from a distance of up to 700 meters.

56. CONSTRUCTION OF SERVICE AMMUNITION

The service round (fig. 94) consists of a cartridge case (1), bullet (2), propellant (3) and primer (4).

The cartridge case is made of steel plated with tombac.* The surface of the cartridge case is brass-plated or has only a lacquered finish.

The cartridge case consists of a body (1a) containing a propellant of smokeless pyroxylin powder, mouth (1b), shoulder (c), rim (1d).

In the base of the cartridge case there is a recess for the primer, and anvil (1e); and two vents (1f) through which the flame from the primer passes to ignite the propellant.

The primer consists of a brass cap containing compressed powder, and metal foil which seals the powder. The weight of the ball cartridge is 16.2 grams.

The bullets have varying construction depending upon their use (fig. 95).

The bullet in the ball cartridge M1943 consists of a steel tombac-plated jacket (1a), lead sleeve (1b) (lead and antimony alloy) and steel core (1c).

The bullet is fastened in the cartridge case by crimping or rolling the cartridge case mouth. The weight of the bullet is 7.9 grams. The nose of the bullet is not painted.

The tracer bullet M1943 consists of steel tombac-plated jacket (2a), lead core (2b) which is pressed into the nose of the sleeve, steel tombac-plated cup (2c) containing tracer element (2d) and ignition composition (2e), and ring (2f) to direct the gases. The bullet weighs 7.5 grams. The nose of the bullet is painted green.

The AP-incendiary bullet M1943 (type BZ) consists of a sealed tombac-plated jacket (3a), tombac cap (3b), lead sleeve (3c), steel core (3d), and lead base filler (3e), and incendiary (3f). The bullet weighs 7.7 grams. The nose of the bullet is painted black and red.

* Tombac, which is usually 89% copper and 11% zinc, is commonly called gilding metal in the United States.

The incendiary bullet M1943 (type Z) consists of a steel tombac-plated jacket (4a), tombac cap (4b), lead sleeve (4c), steel core (4d), steel tombac-plated cup (4e) containing tracer element (4f) and ignition composition (4g); in the nose of the bullet is located the incendiary composition (4h). The bullet weighs 6.6 grams. The nose of the bullet is painted red.

57. ACTION OF SPECIAL PURPOSE BULLETS

Action of Tracer Bullet

At the instant of firing, the ignition composition is ignited by the gases. After the bullet leaves the bore, the ignition composition ignites the tracer element.

Action of the AP-Incendiary Bullet

The bullet perforates armor upon impact due to its core. The incendiary composition is ignited by the impact. The fire produced ignites the fuel.

Action of Incendiary Bullet

At the instant of firing, the incendiary composition is ignited by the gases. When the bullet leaves the bore, the incendiary composition ignites the tracer element.

When the bullet strikes the target, the incendiary composition is ignited by the impact and bursts the tombac cap and bullet sleeve. The flame thus produced easily ignites highly inflammable objects. In the event the tracer element has not burned completely in flight, the burning of the tracer element also serves to ignite objects.

58. TRAINING AMMUNITION, PURPOSE AND CONSTRUCTION

Training ammunition includes drill and blank 7.62-mm rounds M1943.

Drill rounds are designed for training in loading and firing. On the body of the cartridge case there are longitudinal grooves, and on the cartridge case mouth there are marks from the clamping device. The primer is pierced. There is no propellant in the cartridge case.

Blank cartridges are designed for simulating fire and are used in tactical exercises. There is no bullet in the blank cartridge. The mouth is sealed by a star (rosette crimp). It is forbidden to stand closer than 10 meters away from the muzzle face when blank cartridges are being fired.

CHAPTER 11

PACKING AND STORAGE OF AMMUNITION

59. PACKING OF AMMUNITION AND MARKINGS ON PACKAGING

Ammunition is delivered to the using units in wooden boxes, each containing two cases made of zinc-plated iron containing the rounds. On the side of the box is a stencil giving the following data:

1. Caliber of round, model of bullet, cartridge case metal.

2. Number of rounds in box.

3. Lot number of rounds and number of manufacturer.

4. Month and year of manufacture of rounds.

5. Type of powder.

Fig. 96 shows the stencil for 7.62-mm ball ammunition M1943, and for 7.62-mm tracer ammunition M1943. The figures and numbers in the stencil are interpreted as follows:

7.62 PS (or T-45) GZh M43; 7.62 is the caliber of the round; PS (T-45) abbreviated designation of the bullet (PS is ball ammunition with steel core; T-45 is tracer bullet); GZh means steel cartridge case; M43 is the model number.

The designation P29 (R14) is the lot number of the rounds; 3 (711) is the number of the manufacturer.

VIII-51 (VII-50) is the month and year of manufacture.

VUPL is the powder type; 17 is the powder lot; 50 is the year of manufacture of the powder; and K the manufacturer.

A colored stripe is painted on the boxes containing special purpose ammunition.

If the rounds are in clips, the words "In Clips" are also stenciled on the box.

In addition, on the top of the box for any type of ammunition are indicated the class of load, danger sign, and total weight of box.

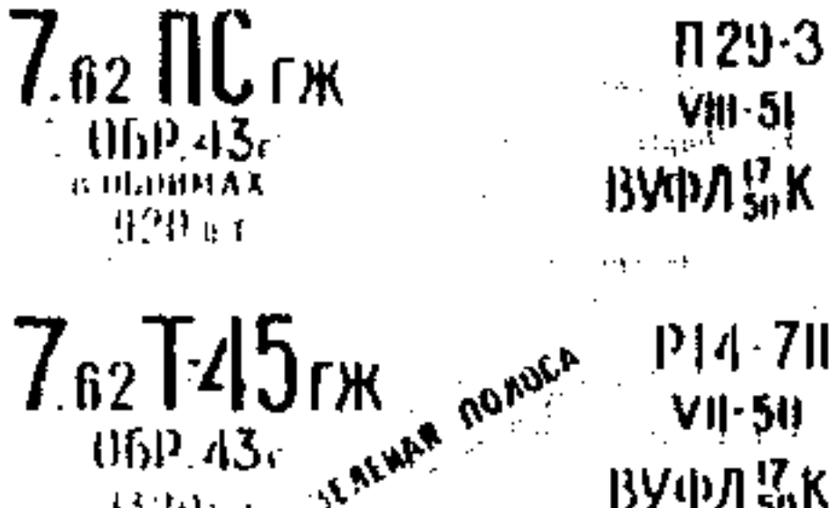

Figure 96. Marking of ammunition boxes.

For example, class XIV denotes that the load is non-explosive, sensitive to fire, and relatively insensible to mechanical blows. On the base of the cartridge case of all rounds there is a stamping, the upper figure of which denotes the number of the manufacturer and the lower the year of manufacture of the rounds.

There are 660 rounds to each zinc-plated case without clips, or 460 in clips. The cases are packed in wooden boxes (two cases per box); in each box there are 1,320 rounds without clips and 920 rounds in clips. The loaded box weighs 29 kg (63.93 lbs.).

On the lid of each case there is a stencil indicating the caliber of round, model of round, cartridge case metal, lot number of round, number of manufacturer, and powder type.

The rounds are packed in the zinc-plated cases in cardboard containers. There are 20 rounds to each cardboard container. There are distinguishing stripes painted on the zinc-plated cases and cardboard containers.

Table of Distinguishing Stripes on Boxes, Cases, and Cardboard Containers

Designation of Round	Abbreviated Designation	Distinguishing Stripes on Boxes
7.62-mm rounds, ball, M1943	ПС	None
7.62-mm rounds, tracer, M1943	Т-45	Green stripe
7.62-mm rounds, AP-incendiary, M1943	БЗ	Black and red stripes
7.62-mm rounds, incendiary, M1943	З	Red stripe

60. STORAGE OF AMMUNITION

The ammunition must be protected from moisture, snow, dust, and dirt. Moist rounds may rust in several days and become unserviceable.

The rounds must not be allowed to come in contact with any liquid, since the liquid will enter the cartridge case

and moisten the propellant, thus causing misfires or hangfires; in such case the bullet may stick in the bore. Rounds must be stored in buildings which are protected from the elements, whether in the factory packing or loose.

If rounds must be stored in the open, they must be protected from rain, sun, dust, and snow. It is not permitted to build a fire near the ammunition.

The ammunition boxes must not be placed immediately on the ground, but on some covering, with the lids upward. It is not permitted to store lubricating and cleaning materials, or foreign objects, together with rounds.

The hermetical seal of the can is broken only when necessary. The distinguishing packaging marks must be heeded before opening the packing.

Drill and blank rounds are stored separately; it is strictly forbidden to store them together with service ammunition.

Rounds which are rusted must be dried with a wet patch. Rounds which are loose must be wiped before being loaded into the magazines. It is not permitted to fire unserviceable ammunition.

It is not permitted to throw ammunition boxes on the ground from vehicles and platforms. It is strictly forbidden to cut open rounds and bullets, strike the rounds with a hammer or other hard object, throw the rounds into a fire, or use the rounds for assembly or disassembly of the rifle (especially special purpose rounds).

APPENDIX I

TABLE OF CHARACTERISTICS OF KALASHNIKOV AUTOMATIC RIFLE WITH WOODEN STOCK

All the characteristics of the automatic rifle with metal stock (weight and dimensional characteristics) are the same as those of the automatic rifle with wooden stock. The automatic rifle with metal stock has a length of 645 mm (25.39 inches), with the stock folded.

Characteristic	Amount
Weight of automatic rifle with magazine and accessories, kg (lb)	4.3 (9.479)
Weight of magazine, empty, kg (lb)	.42 (.9259)
Weight of magazine, loaded, kg (lb)	.920 (2.028)
Weight of automatic rifle with loaded magazine, kg (lb)	4.80 (10.58)
Length of automatic rifle, overall, mm (inches)	870 (34.251)
Length of barrel, mm (inches)	415 (16.338)
Length of rifled portion of bore, mm (inches)	369 (14.527)
Length of sighting line, mm (inches)	378 (14.881)
Capacity of magazine, rounds	30
Rate of fire, rounds/minute	600
Muzzle velocity, ball cartridge, m/sec (ft/sec)	710 (2329.38)
Weight of bullet, ball cartridge, grams (grains)	7.9 (121.9156)
Weight of ball cartridge, grams(grains)	16.2 (250.0042)

APPENDIX II

GUN DATA CARD NO._____

Designation and Number of Weapon* _____
(The full designation is not written)

Manufacturer _____

Year of Manufacture _____

Designation of using unit _____

Assigned to _____
(surname and initials)

Classification as Non-serviceable _____
(Authority)

Defects at time of issue	Date of accuracy check	Results of accuracy check	Signature of officer supervising accuracy check	Changes in condition of weapon discovered in inspection		Remarks
				Squad leader	Chief of Artillery Materiel	
Barrel without defects. First category. Chief of Artillery Materiel, Capt. (Signature) (Date)	(Date)	Normal	Company Commander (Signature)		Gage K-2 enters a distance of 2 mm from muzzle face. (Signature) (Date)	

*The abbreviated designation of the weapon is shown, for example "7.62-mm automatic rifle", since the card is not secret.

DEPARTMENT OF THE ARMY

OPERATOR'S MANUAL FOR

AK-47
ASSAULT RIFLE

TECHNICIANS FOR VICTORY

PRODUCED BY 203d MILITARY INTELLIGENCE BATTALION

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LOADING:

A. Check ammo for dents in cartridges and bad primers.

B. When inserting magazine into magazine well, be sure to insert forward lip of magazine into well first. Be sure that magazine is fully seated.

FIRING

A. Pull charging handle, shown on page 11 figure 16, fully to the rear and release.

NOTE: DO NOT RIDE CHARGING HANDLE FORWARD:

B. When on the firing line, keep your weapon up and pointed down range at all times. If you have a malfunction, raise your hand and range personned will aid you.

CAUTION: Only blank ammunition may be fired when the blank firing device is in place. Do not use the cap of the combination tool kit as a blank firing device.

HAND GRENADE LAUNCHER: The hand grenade launcher is installed by removing the muzzle nut (fig. 53) and screwing the launcher onto the weapon (fig. 54).

TO FIRE THE GRENADE: Insert a grenade with the pin pulled into the launcher. **CAUTION:** A special type cartridge is used for firing the grenade. Place the butt of the weapon on the ground and fire from this position. The maximum effective range the grenade can be fired is 150 meters.

THE BAYONET: (fig. 55) is affixed by positioning its loops in front of the muzzle nut and gas cylinder body and sliding the bayonet to the rear until the bayonet catch engages the muzzle nut (fig. 56). The bayonet is removed by pulling the catch, located behind the hilt, away from the handle and sliding the bayonet forward and off.

PLASTIC MAGAZINE: The Soviet AK-47 metal magazine is gradually being replaced by the plastic magazine, (fig. 57), which is lighter than the metal. The plastic magazine, because it is lightweight and waterproof, is used mainly by marines, airborne, and armor units.

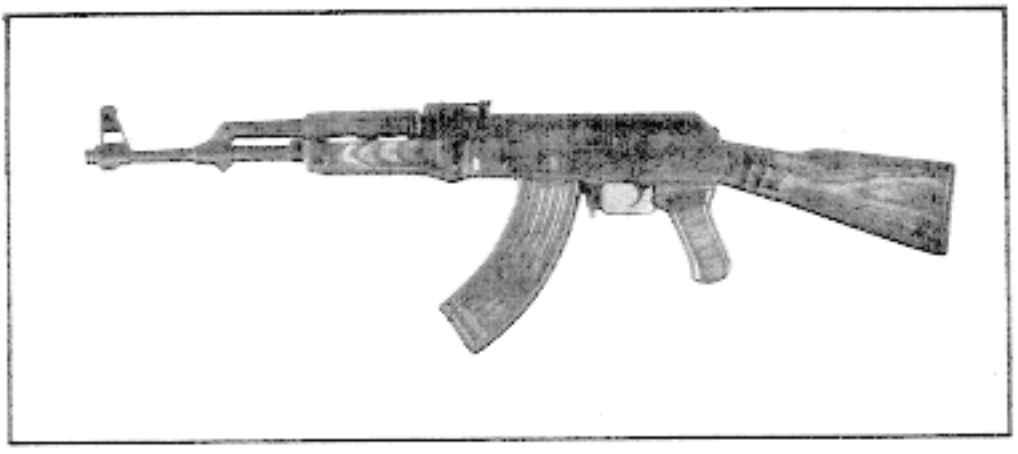

FIGURE 1. LEFT VIEW, AK-47

FIGURE 2. RIGHT VIEW, AK-47

SECTION I. GENERAL

The AK-47 (fig 3) is a short, compact, selective-fired weapon designed by the Soviets in 1946 which fires a cartridge intermediate in power between submachine gun and rifle cartridges. It has a mild recoil which gives it the capability of delivering effective full automatic fire up to 300 meters.

In addition to the Soviet Union, the People's Republic of China, East Germany, Poland, Bulgaria, Romania, North Korea, Hungary, and Yugoslavia have manufactured the AK-47. The selector markings on the right side of the receiver provide a ready means of identifying the country of origin (fig 4).

The AK-47 is produced in two different basic models - one with a conventional fixed wooden stock (fig 5) and the other with a folding metal stock (fig 6). The folding stock is used mostly by airborne and armor units.

SECTION II. TECHNICAL DATA

Cartridge	7.62x39mm
Feed	Magazine (fig 7)
Magazine capacity	30 rds
Gas operated	
Weight	9.5 lb
Length	34.2 in
Length w/folded stock	27.5 in
Rate of fire semiautomatic	40 rpm
Rate of fire automatic	100 rpm
Rate of fire cyclic	600-800 rpm
Maximum effective range	400 meters

FIGURE 3. AK-47

WEAPON MARKINGS

FACTORY	SELECTOR			COUNTRY
	SAFE-UPPER	MID	LOWER	
1954 г		АВ	ОД	USSR
56 1		连	单	PRC
		L	D	PRC
M22		L	D	PRC
58		크	단	N. KOREA
		AB	ЕД	BULG.
1962		C	P	POL.
1966	S	FA	FF	RUM.
65		D	E	E. GERM.
1951 г		АВ	ОД	USSR
		小		PRC
				PRC
				PRC
				E. GERM.
				PRC
416				PRC
		ПР	ОГОНЬ	USSR
		ПР	ОГОНЬ	USSR
				CZECH
		∞	1	HUNGARY
		...	.	FINLAND
		R	J	YUGOSLAVIA
		30	1	CZECH
63		D	E	E. GERM.
		2 1L	CHL	N. KOREA
		L	D	PRC

FIGURE 4

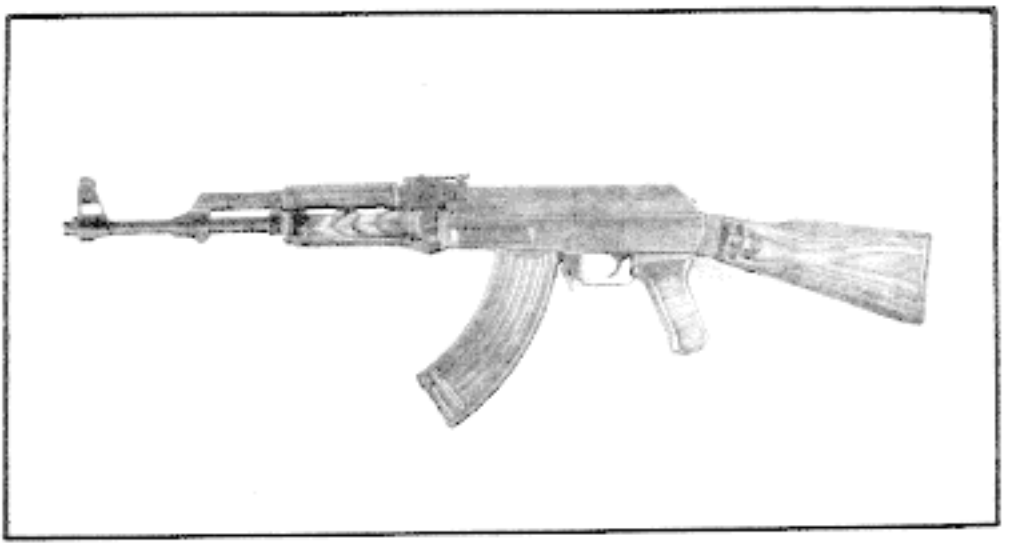

FIGURE 5. WOODEN STOCK

FIGURE 6. FOLDING STOCK

SECTION III. OPERATION

Loading the Magazine: Place a round between the feed lips (fig 8). Press it down until it locks inside the magazine. Repeat until magazine is full (30 rds).

Inserting the magazine into the receiver: Cant the magazine forward so the lug on the front of the magazine engages with its recess in the magazine well (fig 9); then pull the magazine to the rear until it snaps into place.

Loading the AK-47: Pull the operating handle (fig 10), fully to the rear and release it so the lug on the bottom of the bolt can strip a round from the magazine and into the chamber. NOTE: The selector (fig 11), must be in a firing position.
CAUTION: Always keep the selector in the safe (upper) position until the weapon is ready to be fired.

Firing the AK-47: Place the selector on the desired position (automatic middle position, and semi-automatic lower position)(fig 12). Aim using a normal sight picture and pull the trigger.

The AK-47 with the metal stock can also be fired with the stock folded. This is done by pressing the stock latch located on the left rear of the receiver (fig 13), swinging the stock down beneath the weapon (fig 14). This position is used mainly by airborne and armor units.

Immediate action: For a runaway gun, keep the rifle pointed up and down range until all ammunition is expended. Clear the weapon and inspect it to determine the cause of the malfunction. Immediate action for a misfire is to keep the rifle pointed down range for at least one minute. Then pull the operating handle to the rear and eject the misfired round. Load a new round and attempt to fire it. If it does not fire, wait one minute and then unload the rifle. Inspect to determine the cause of the malfunction.

Unloading: Remove the magazine by pressing the magazine catch (fig 15) toward the magazine; then swing the magazine forward and out of the receiver. Pull the operating handle fully to the rear, inspect the chamber and receiver. If no cartridge is present, release the operating handle and pull the trigger (fig 16).

Zeroing: Set the rear sight for the desired range by pressing in on the slide catch and moving the slide bar along the leaf until the front edge of the bar is aligned with the line below the number that corresponds with the range in meters (fig 17).

The front sight post can be screwed in or out of its base to adjust for elevation. The wrench in the combination tool kit is used

for this purpose (fig 18). Lateral zeroing is done by moving the cylindrical front sight post mount from side to side using the lateral zeroing tool (fig 19).

If the strike of the bullet is below the control point, the front sight should be screwed in. If above, it should be screwed out. If the strike of the bullet is to the left of the control point, the slide of the front sight should be moved to the left; if to the right, to the right.

Moving the front sight slide to the left, right, up or down 1mm, changes the strike of the bullet 26cm at 100 meters. One full turn on the front sight post moves the strike of the bullet 20cm when firing at 100 meters. Front sight post changes should be verified by a group of four individually aimed shots. After the weapon has been zeroed, the old mark should be removed and a new one written in.

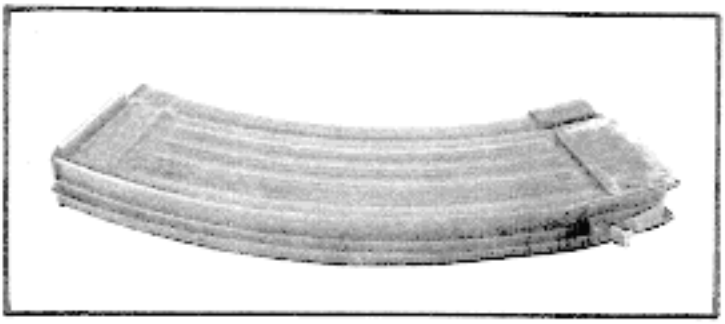

FIGURE 7. AK-47 MAGAZINE

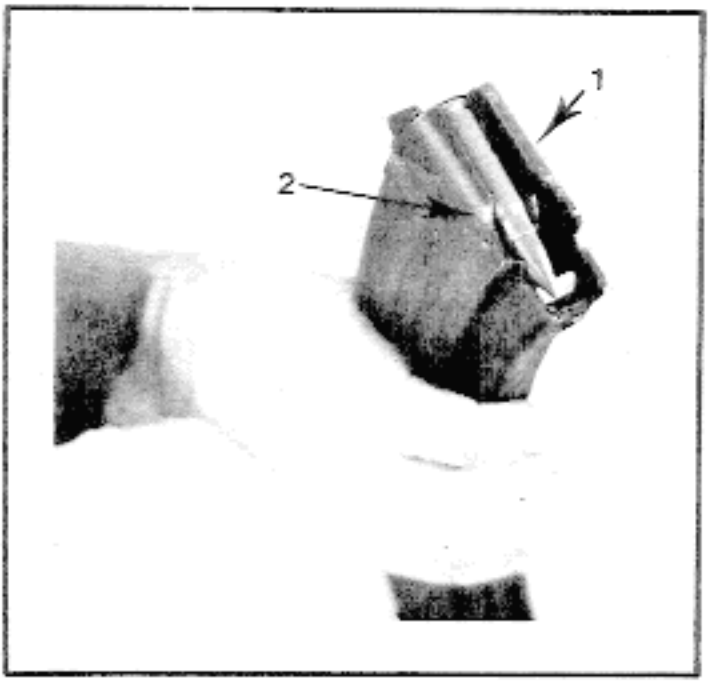

FIGURE 8. LOADING MAGAZINE

1 & 2. FEED LIPS

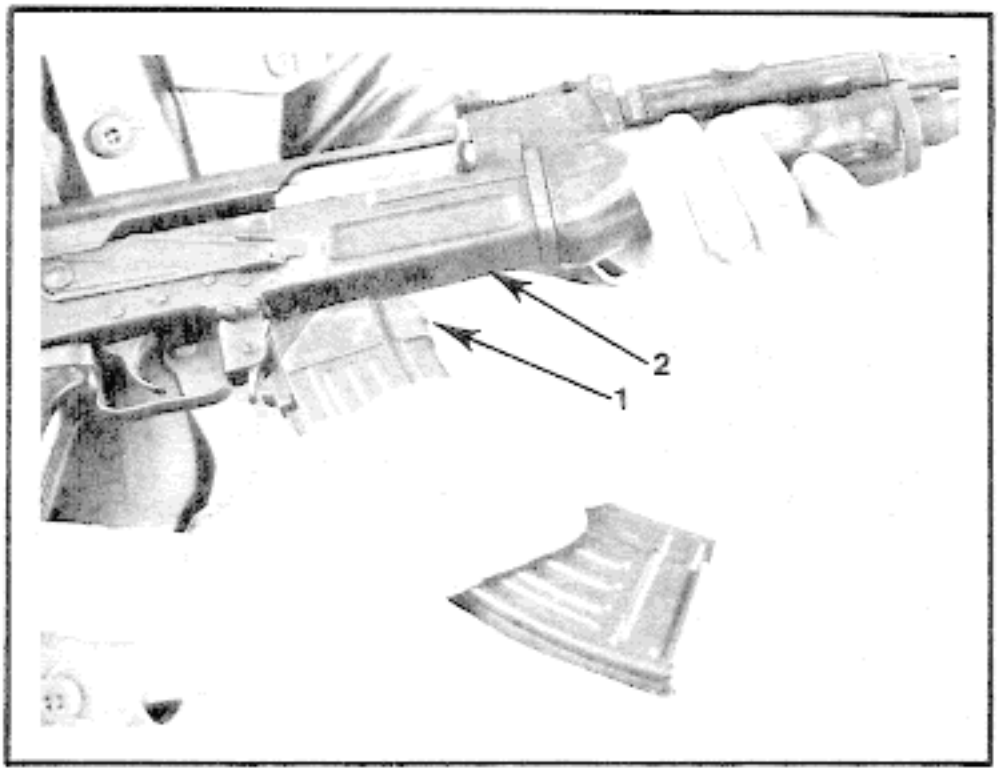

FIGURE 9. INSERTING MAGAZINE

1. MAGAZINE LUG

2. MAGAZINE WELL

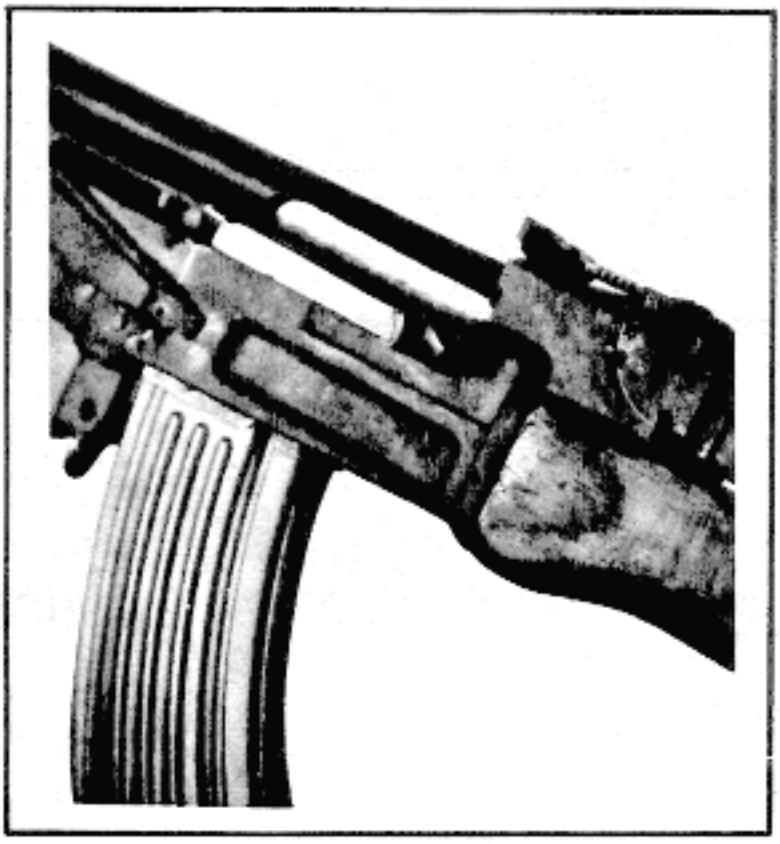

FIGURE 10. OPERATING HANDLE

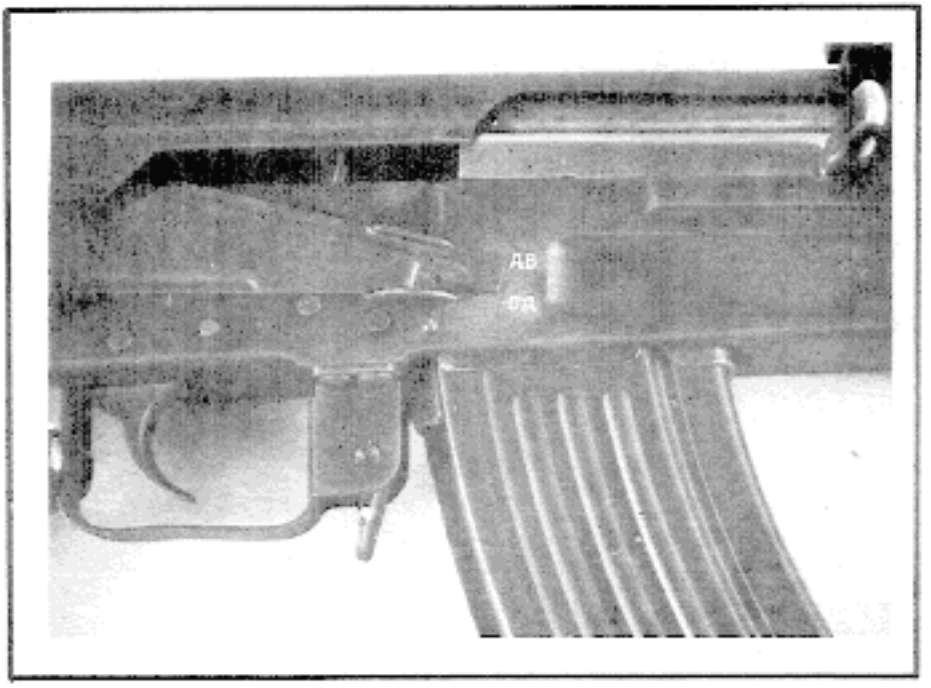

FIGURE 11. SELECTOR IN FIRING POSITION

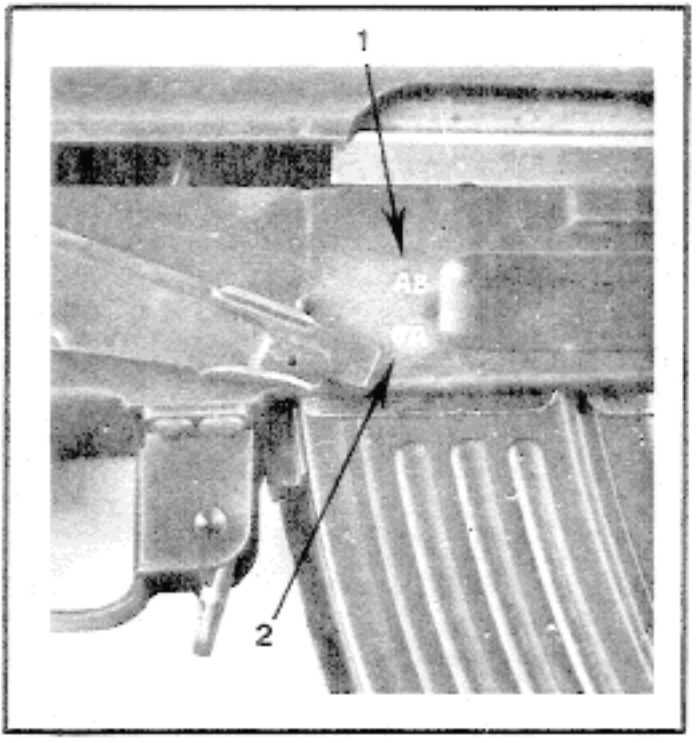

FIGURE 12. SELECTOR IN FIRING POSITION

1. AUTOMATIC

2. SEMIAUTOMATIC

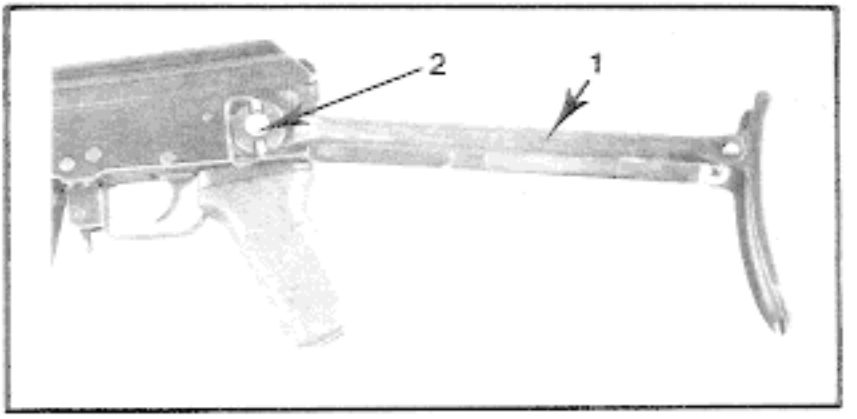

FIGURE 13. FOLDING STOCK

1. STOCK
2. STOCK LATCH

FIGURE 14. STOCK FOLDED

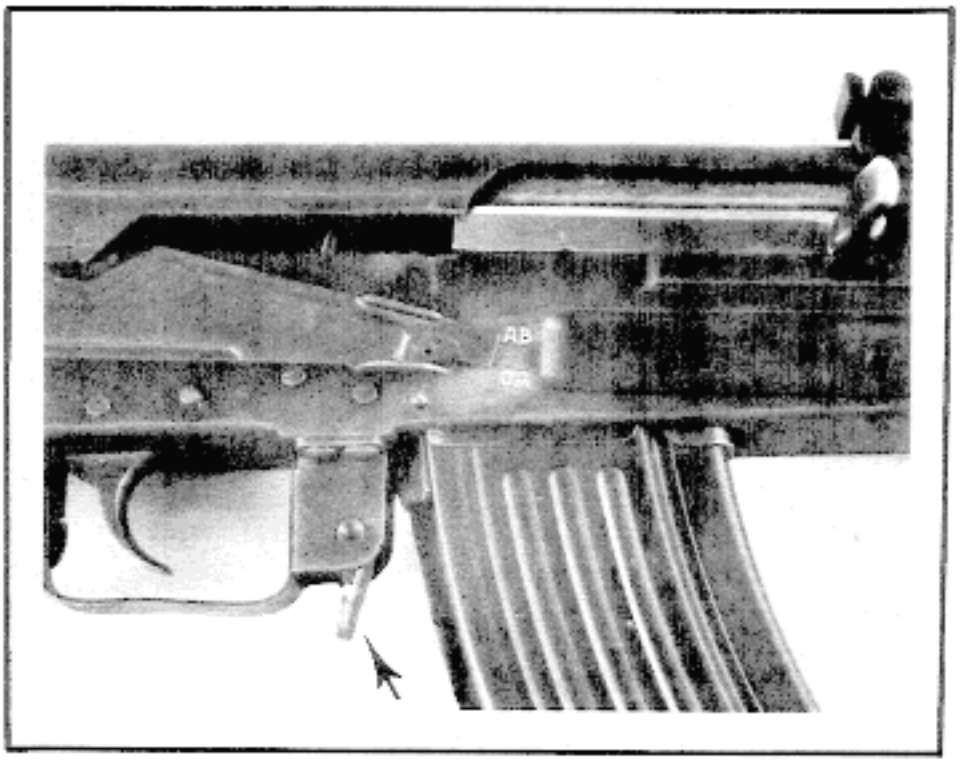

FIGURE 15. MAGAZINE CATCH

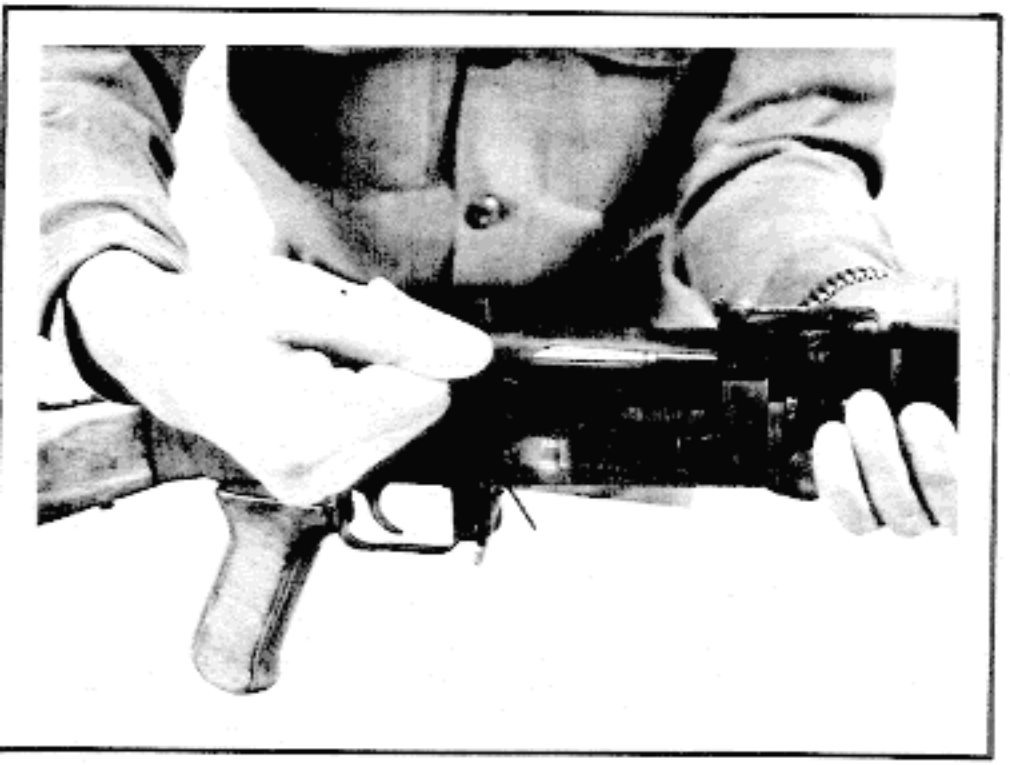

FIGURE 16. OPERATING HANDLE

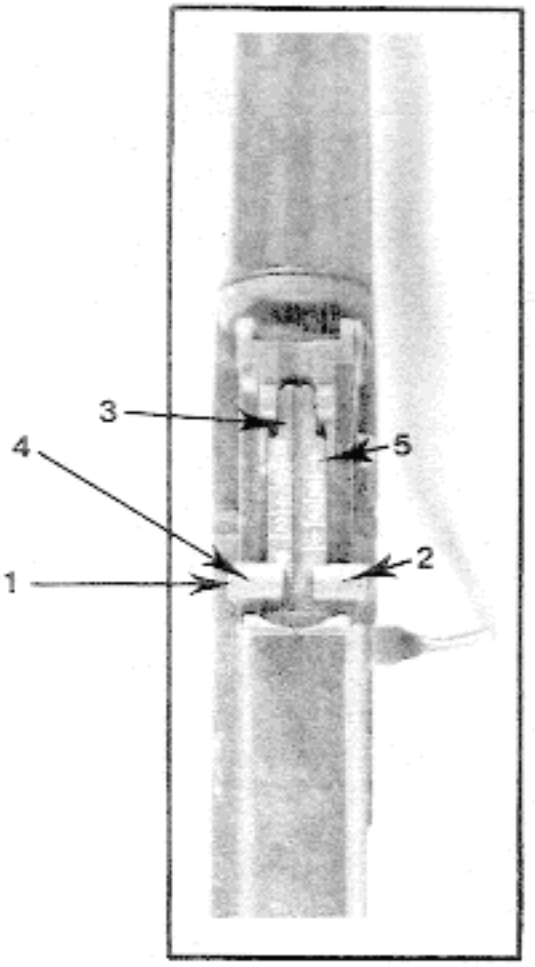

FIGURE 17. REAR SIGHT

1. SLIDE CATCH
2. SLIDE BAR
3. LEAF
4. BAR FRONT EDGE
5. NUMBERS

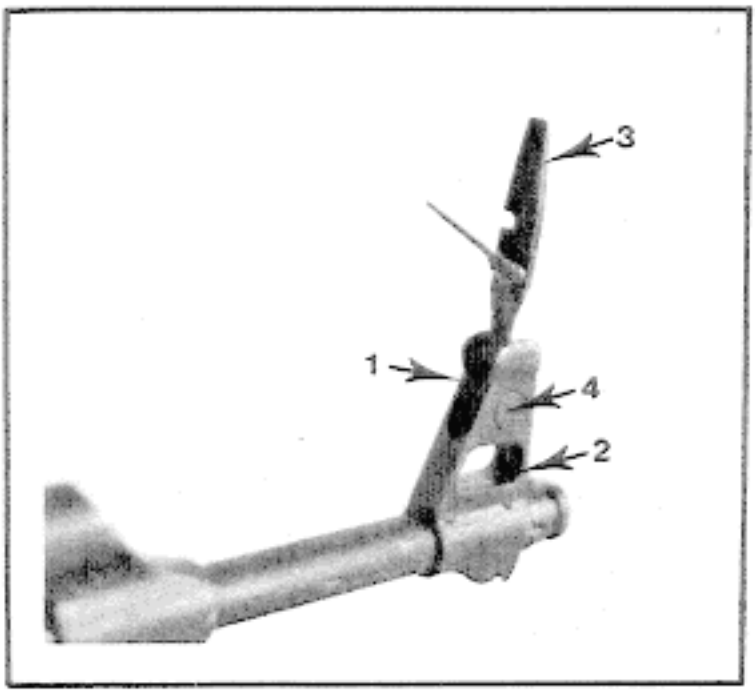

FIGURE 18. FRONT SIGHT

1. FRONT SIGHT POST
2. BASE
3. COMBINATION TOOL
4. CYLINDRICAL POST MOUNT

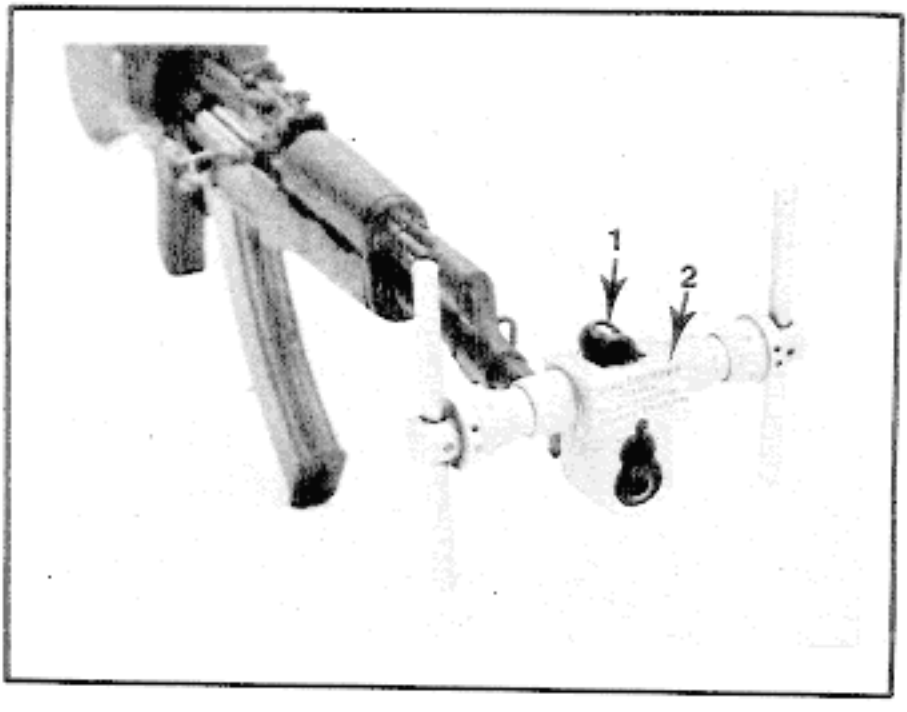

FIGURE 19. FRONT SIGHT

1. FRONT SIGHT BASE
2. SPECIAL TOOL

SECTION IV. DISASSEMBLY

Unloading and clearing the AK-47: Remove the magazine and pull the operating handle fully to the rear. Inspect the chamber and receiver to insure no cartridges are present. Release the operating handle and pull the trigger (fig 20).

Remove the bolt cover: Press the serrated end of the driving spring guide (fig 21) into the bolt cover, and while holding the guide in, lift off the bolt cover, rear end first (fig 22).

Remove the driving spring assembly: Push forward on the end of the driving spring guide (fig 23), disengaging it from its seat in the rear of the receiver (fig 24); then pull the complete driving spring assembly out of the bolt carrier (fig 25).

Remove bolt and carrier: Pull the operating handle fully to the rear (fig 26), lift the bolt carrier slightly upward (fig 27) and then remove the bolt and carrier by pulling it to the rear (fig 28).

Remove the bolt from the carrier: Press the bolt into the carrier (fig 29) until the bolt operating lug can be twisted free of its cam path in the carrier (fig 30). Pull the bolt straight forward and out of the carrier (fig 31).

Remove gas cylinder tube: Rotate the gas cylinder tube lock upward (fig 32 and 33) to free the gas cylinder tube. Pull up on the rear of the hand guard and remove the tube (fig 34).

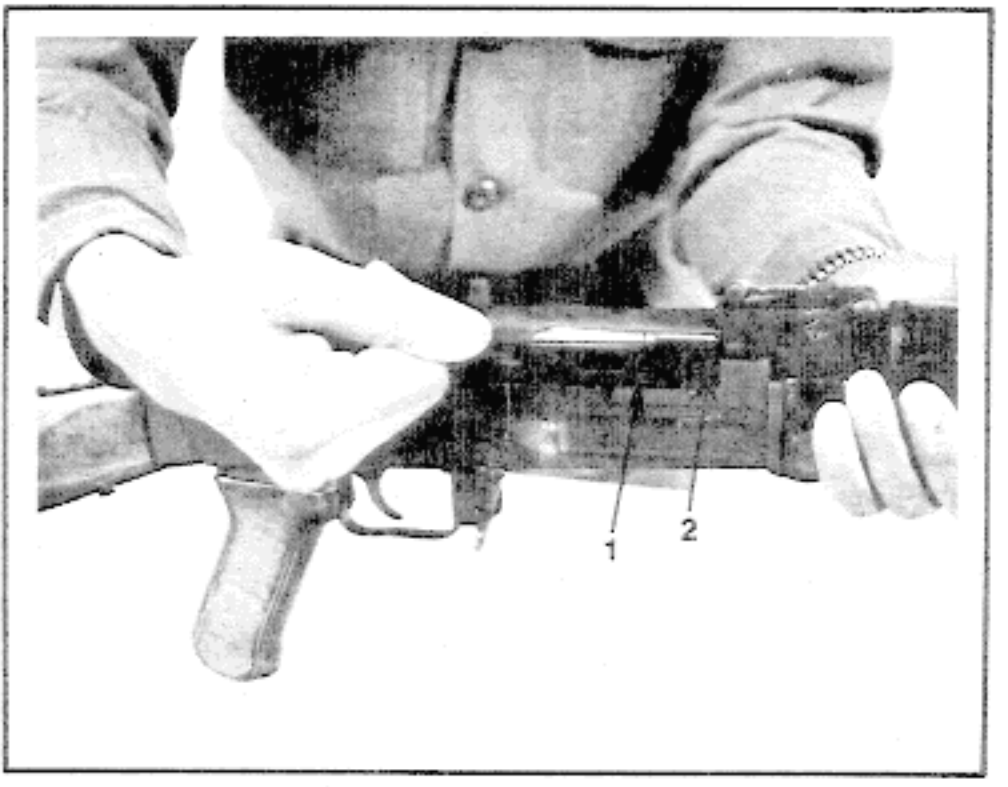

FIGURE 20. CLEARING THE AK-47

1. RECEIVER
2. CHAMBER

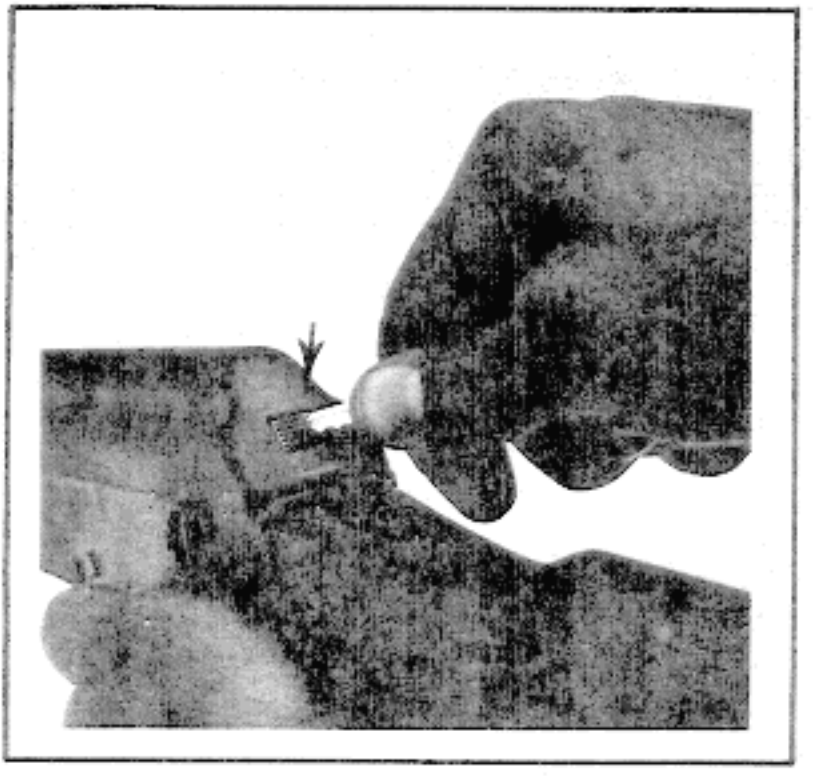

FIGURE 21. DRIVING SPRING GUIDE

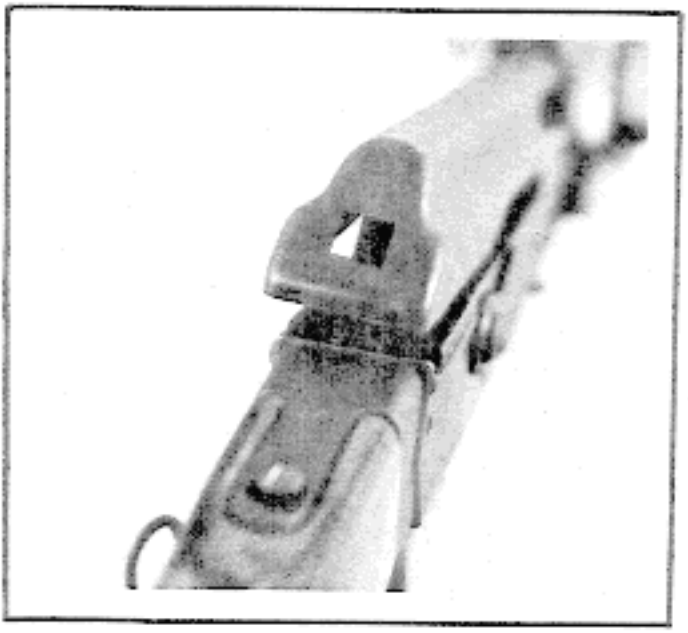

FIGURE 22. REMOVING BOLT COVER

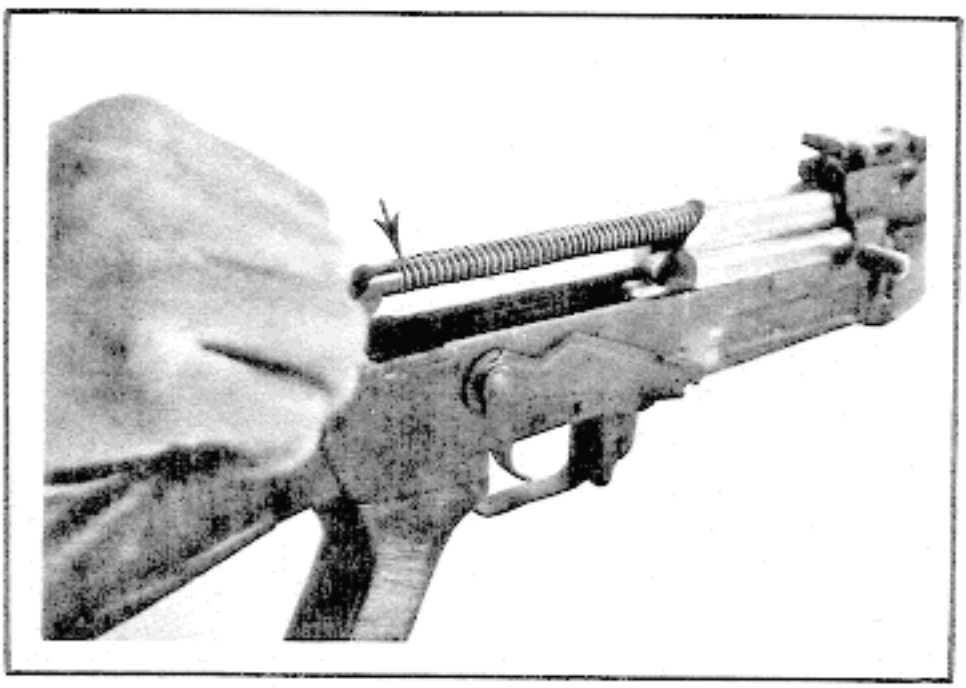

FIGURE 23. DRIVING SPRING

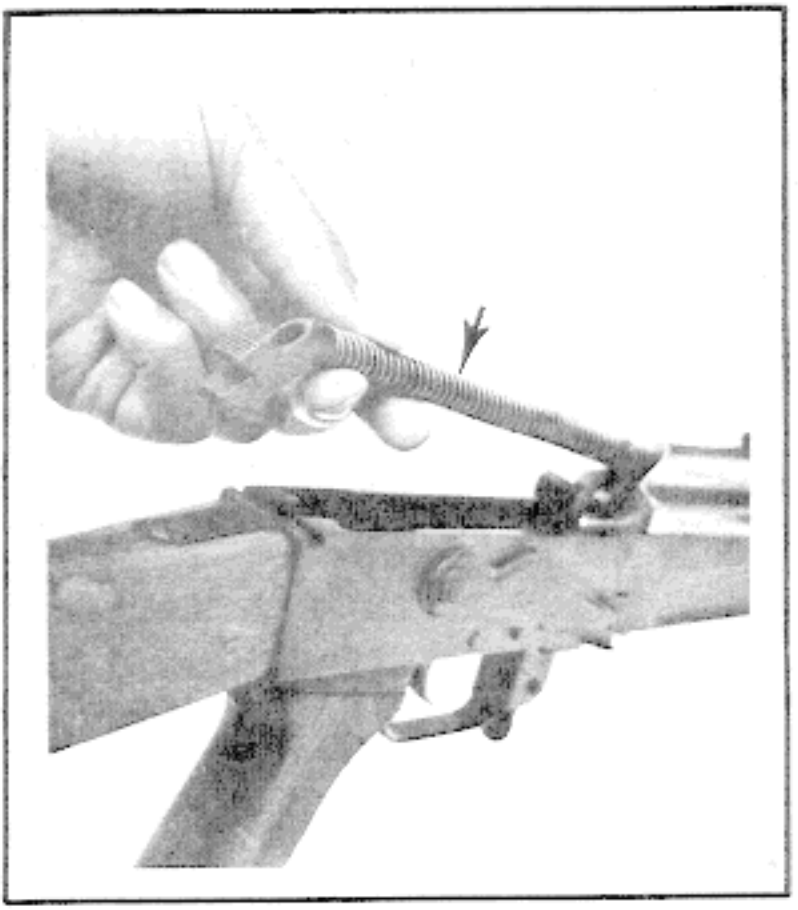

FIGURE 24. DISENGAGING DRIVING SPRING

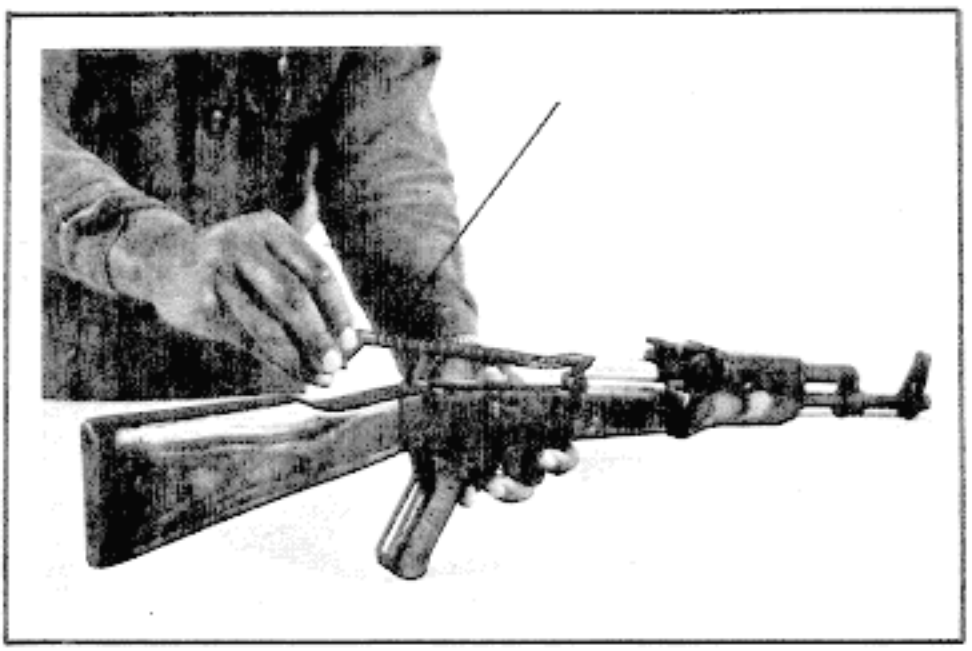

FIGURE 25. REMOVING DRIVING SPRING ASSEMBLY

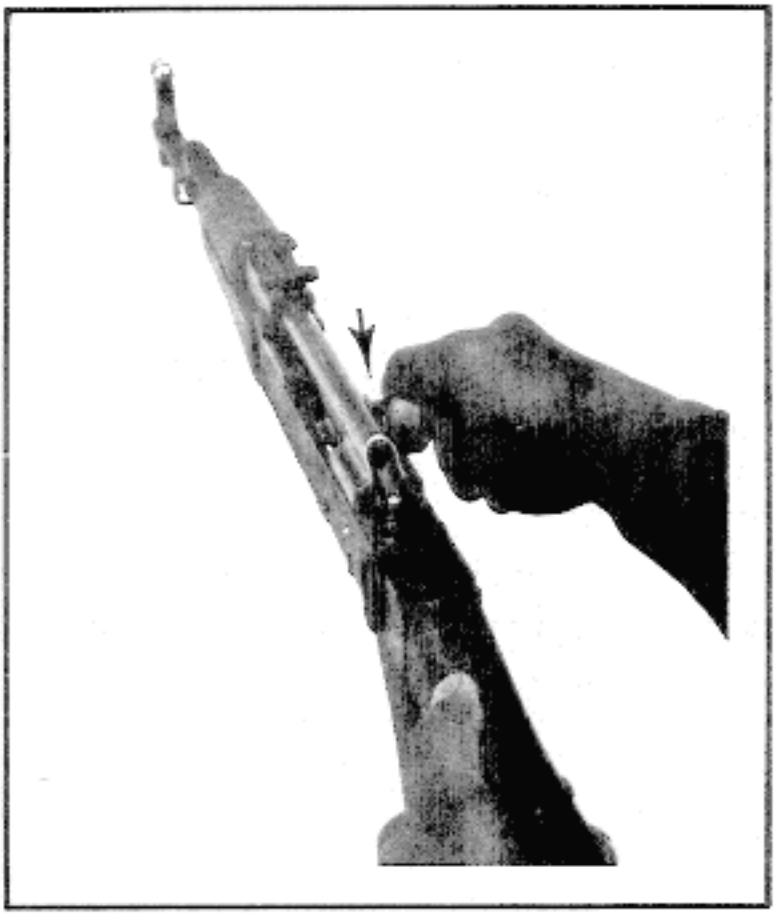

FIGURE 26. OPERATING HANDLE

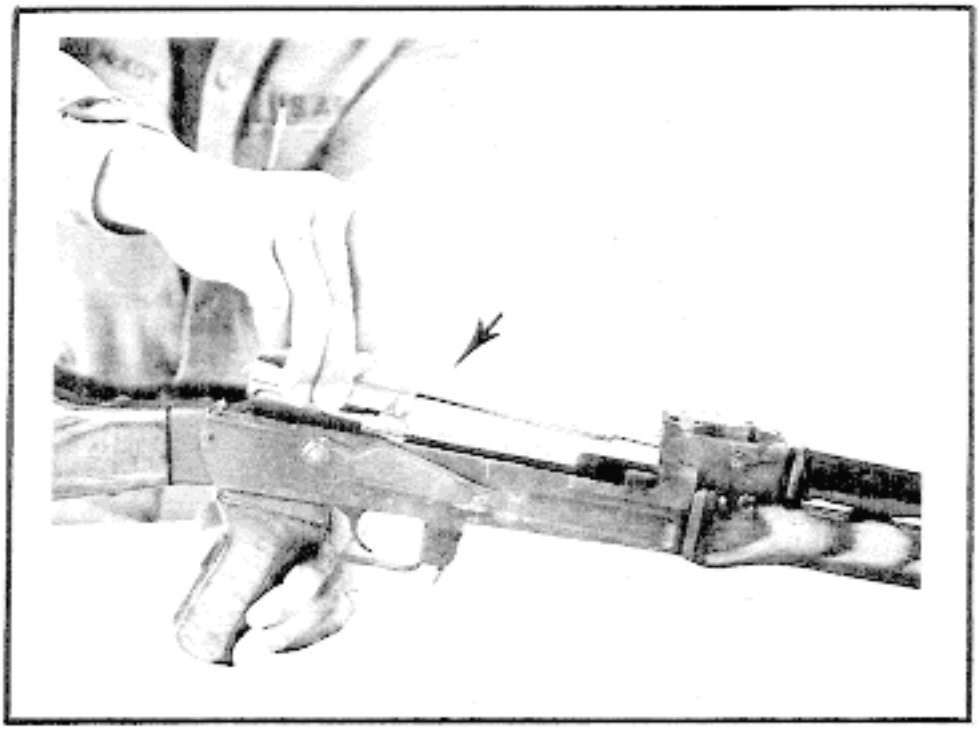

FIGURE 27. LIFTING BOLT CARRIER

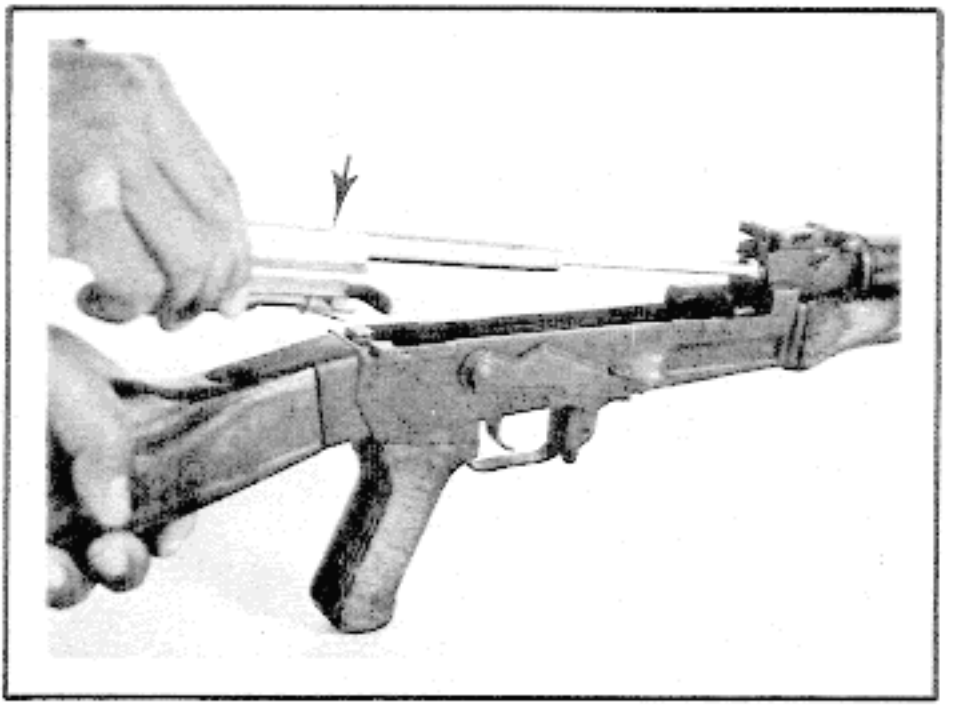

FIGURE 28. REMOVING CARRIER

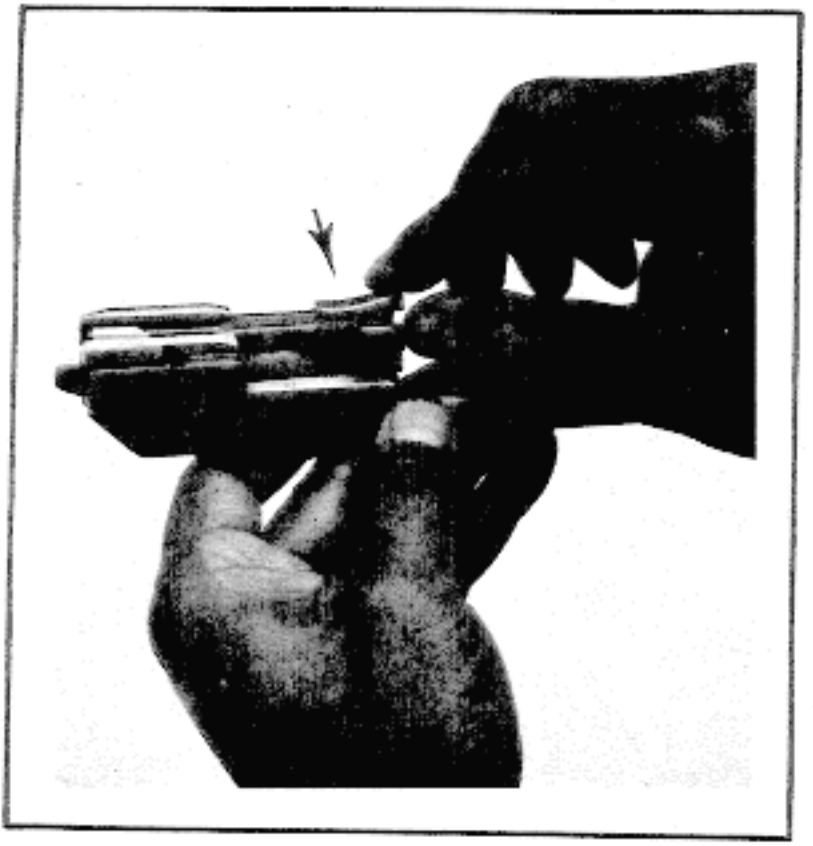

FIGURE 29. REMOVING BOLT

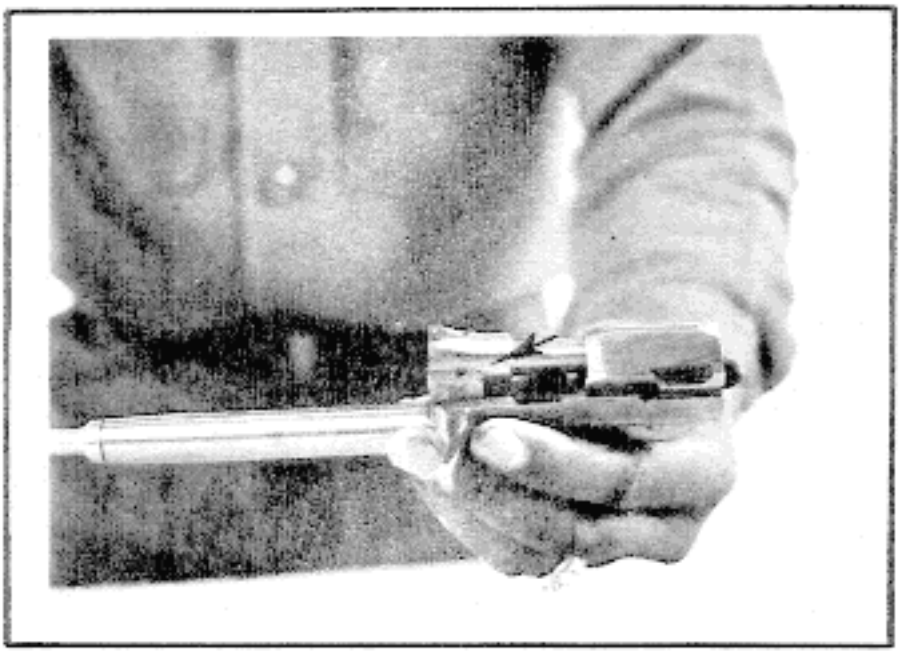

FIGURE 30. OPERATING LUG

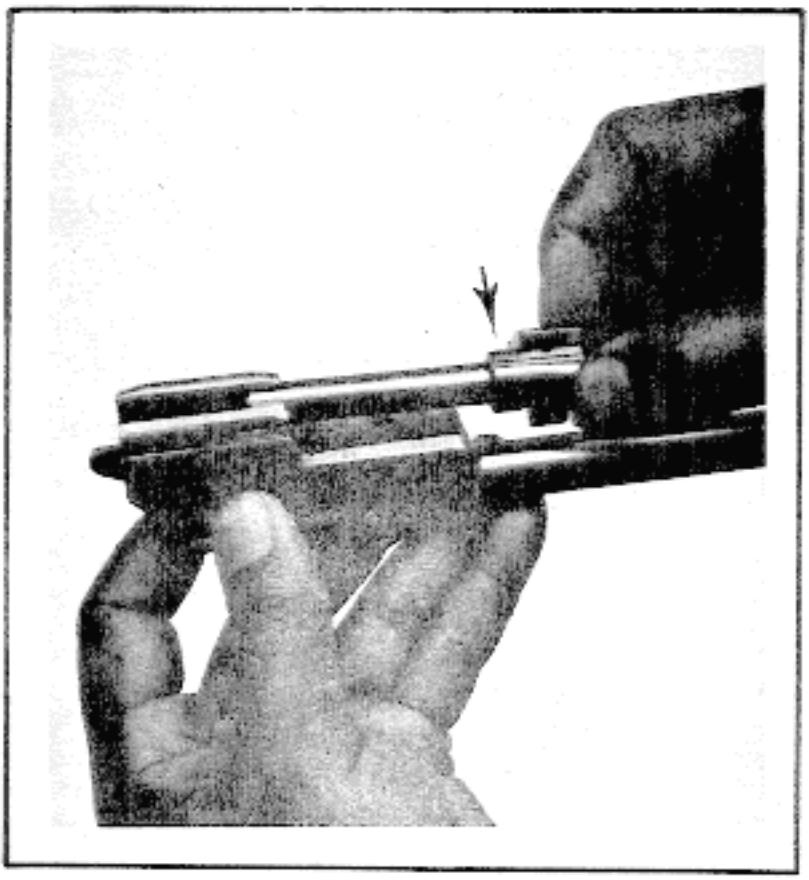

FIGURE 31. REMOVING BOLT

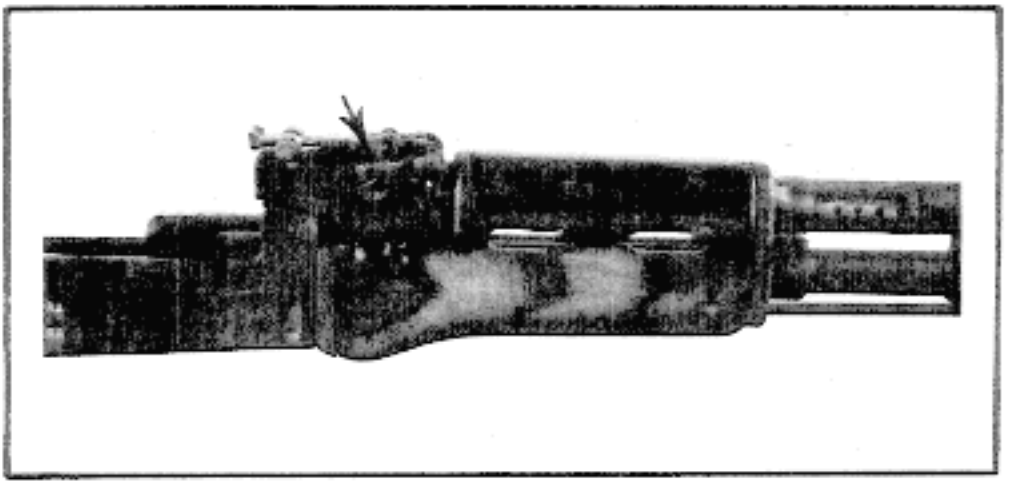

FIGURE 32. TUBE LOCK

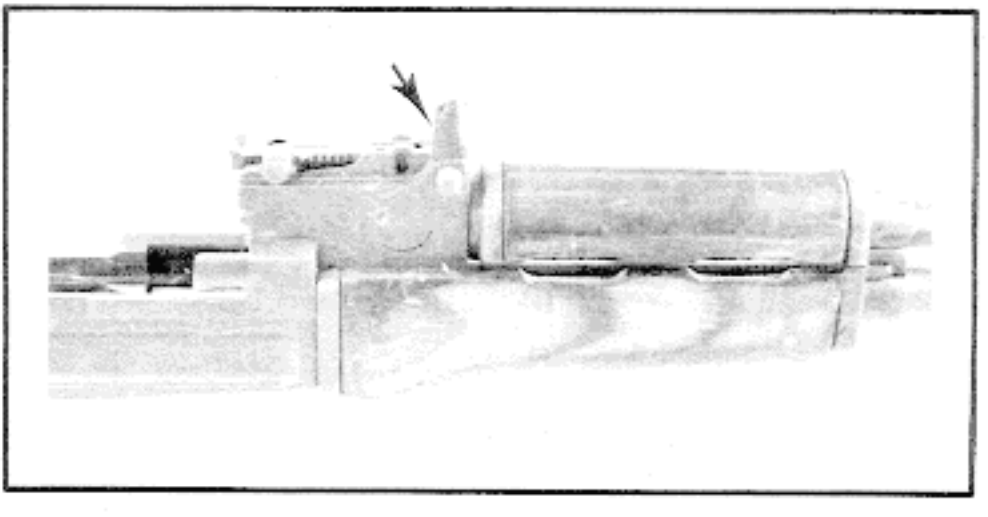

FIGURE 33. TUBE LOCK UPWARD

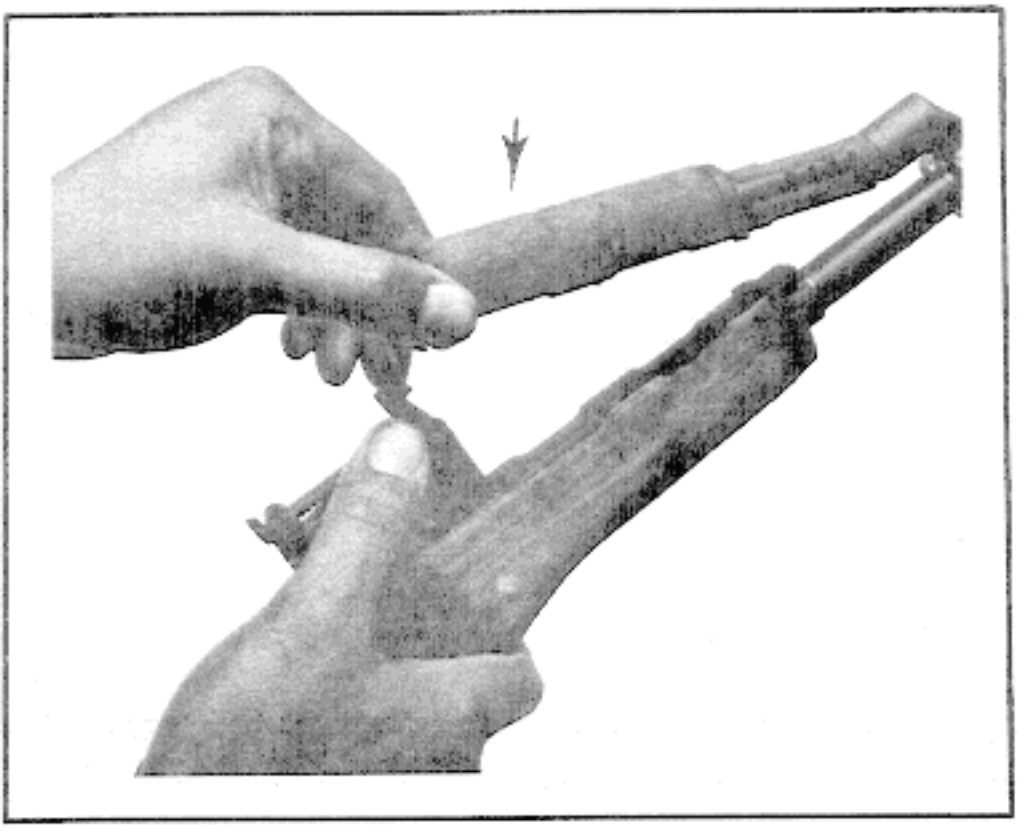

FIGURE 34. REMOVING HAND GUARD

SECTION V. REASSEMBLY

First, engage the front opening of the gas cylinder tube with the gas cylinder (fig 35). Then seat the rear of the tube into the rear sight base (fig 36). Rotate the gas cylinder tube lock down to its lock position (fig 37).

Replace the bolt: Slide the spindle of the bolt into the carrier (fig 38) and rotate the bolt to mate the operating lug with its cam path. Pull the bolt as far forward as possible in carrier (fig 39).

Replace bolt carrier: Slide the piston into the hole under the rear sight (fig 40) until the carrier fits into its cuts at the rear of the receiver (fig 41). Press the carrier down, with the bolt fully forward, and then slide the carrier fully forward (fig 42).

Replace driving spring: Insert the driving spring into its hole in the rear of the carrier (fig 43) and reseat the guide into its slot in the receiver (fig 44).

Replace the bolt cover: Insert the front end of the bolt cover into the circular grooves in the rear sight base (fig 45). Apply thumb pressure over the square hole in the rear of the cover (fig 46); press down and forward until the end of the driving spring guide snaps through the hole (fig 47).

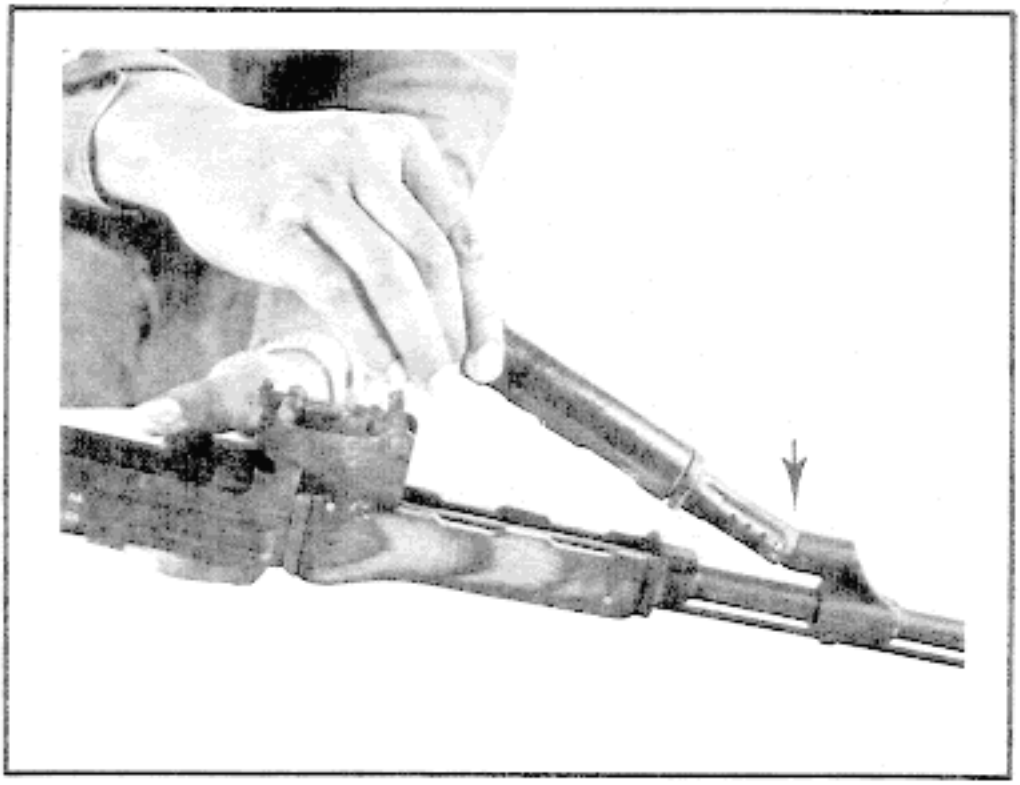

FIGURE 35. ENGAGING TUBE

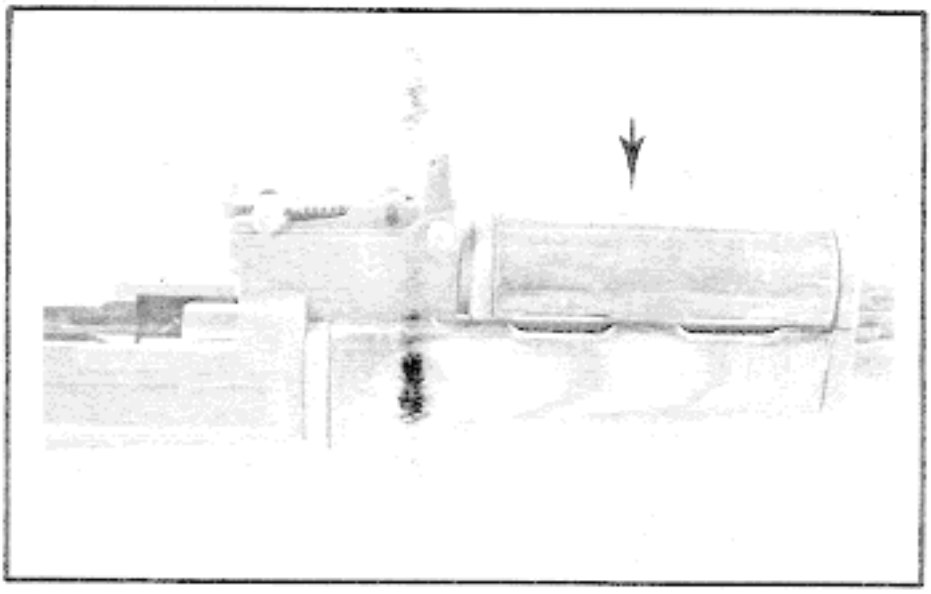

FIGURE 36. TUBE SEATED

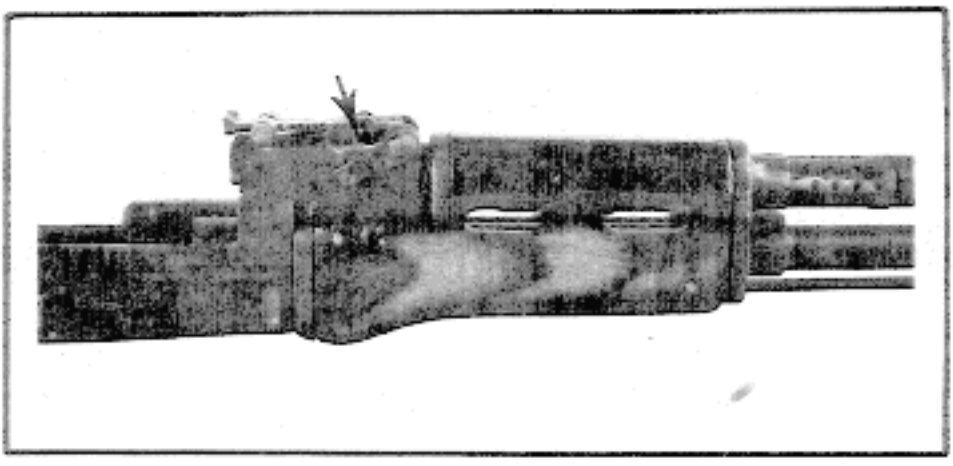

FIGURE 37. GAS CYLINDER TUBE IN LOCK POSITION

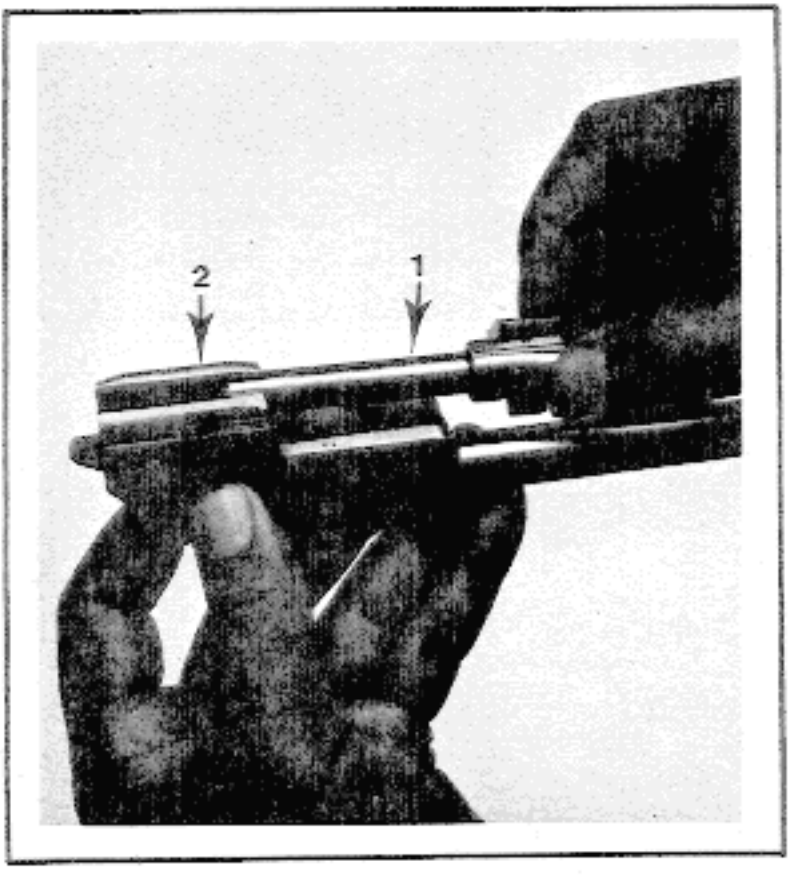

FIGURE 38. REPLACING THE BOLT

1. SPINDLE
2. CARRIER

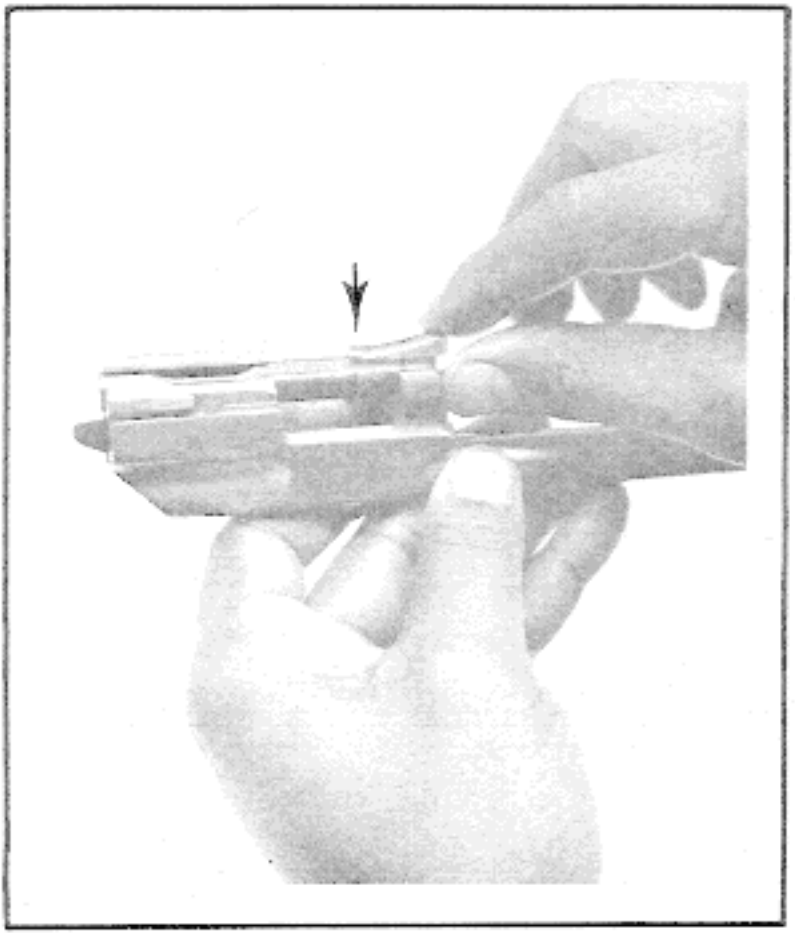

FIGURE 39. BOLT IN CARRIER

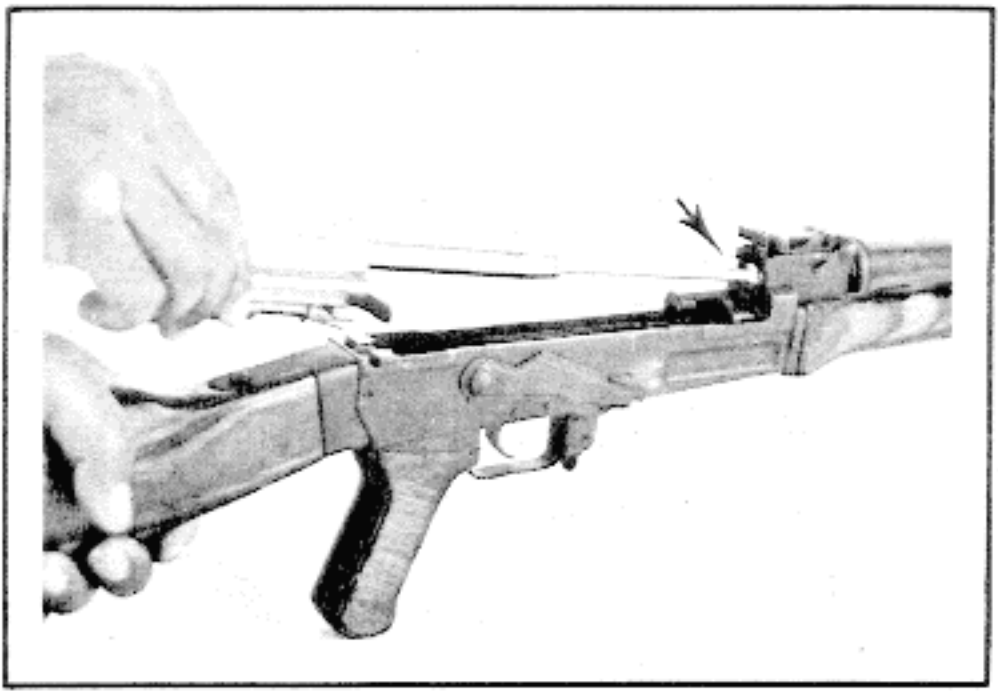

FIGURE 40. REPLACING BOLT CARRIER

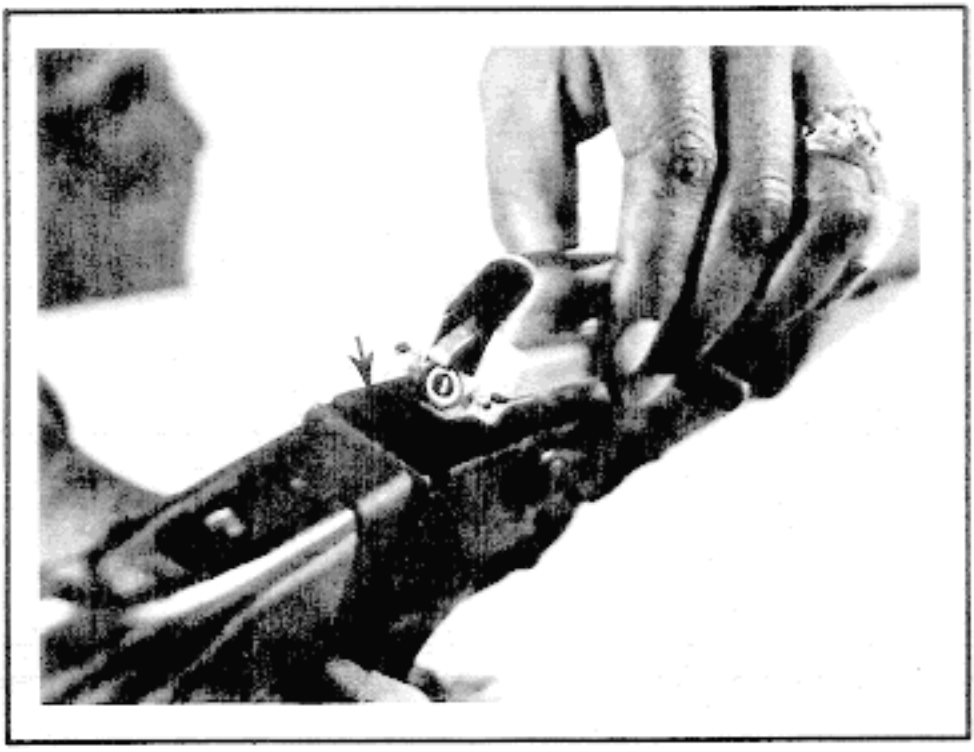

FIGURE 41. CUT IN RECEIVER

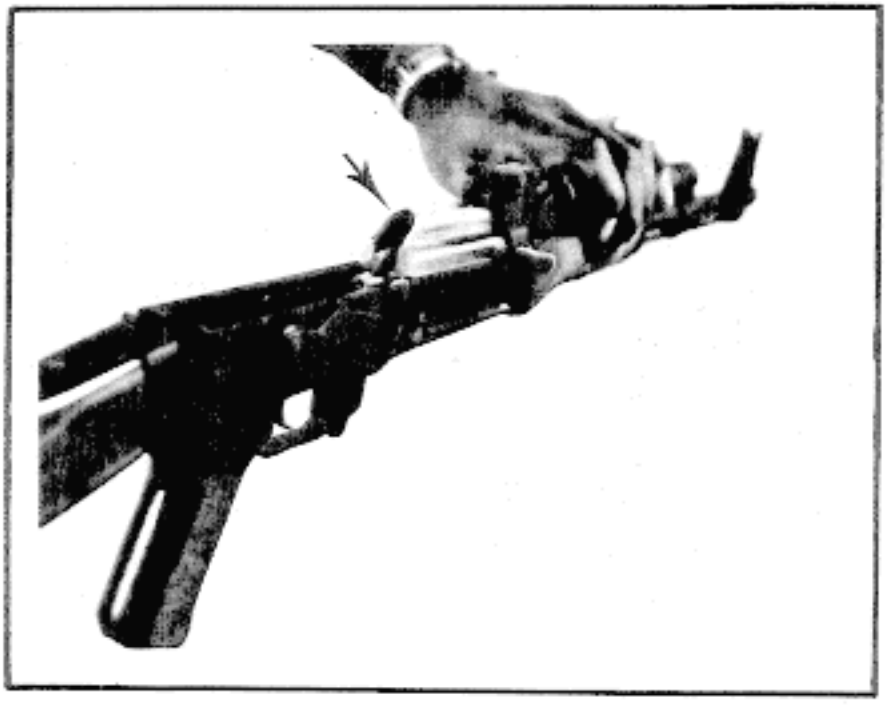

FIGURE 42. CARRIER SEATED

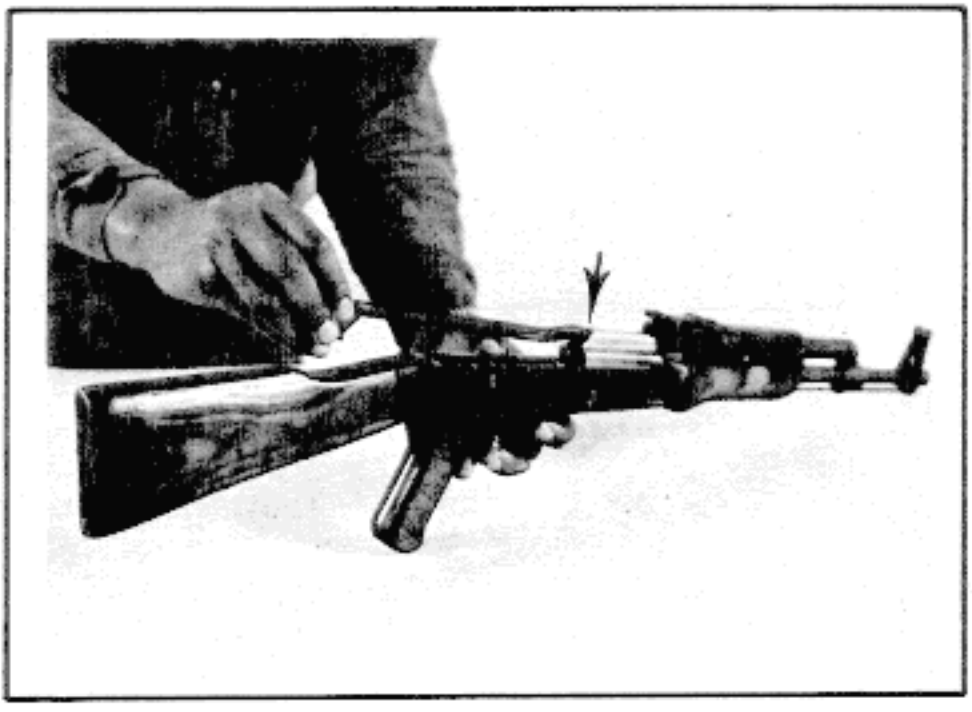

FIGURE 43. REPLACING DRIVING SPRING

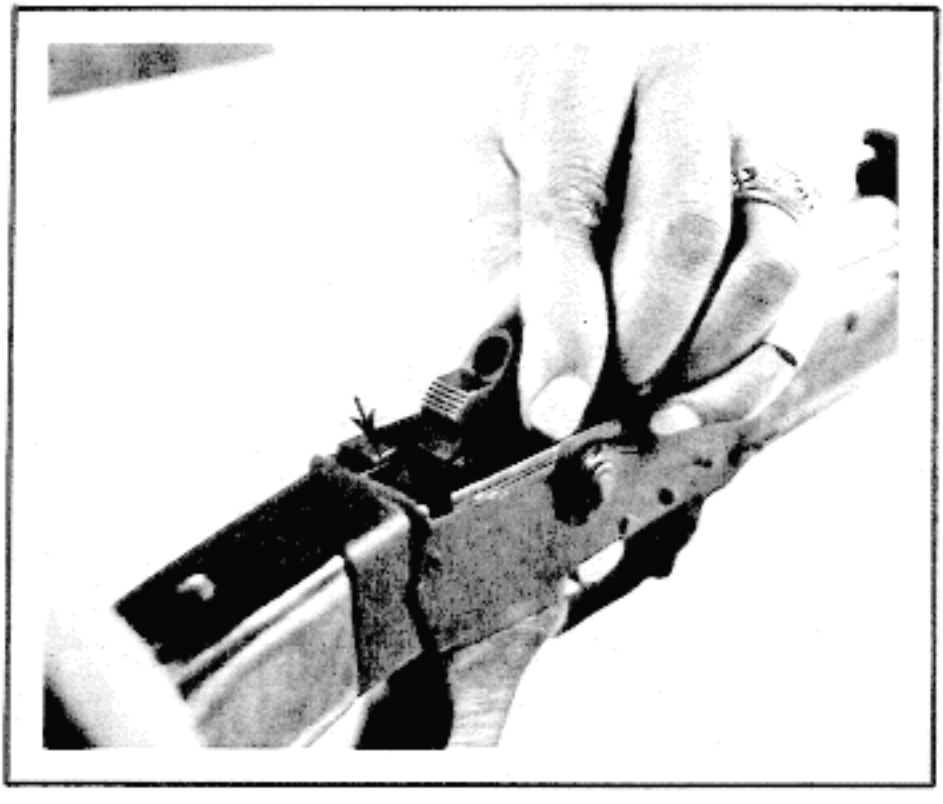

FIGURE 44. DRIVING SPRING GUIDE SLOT

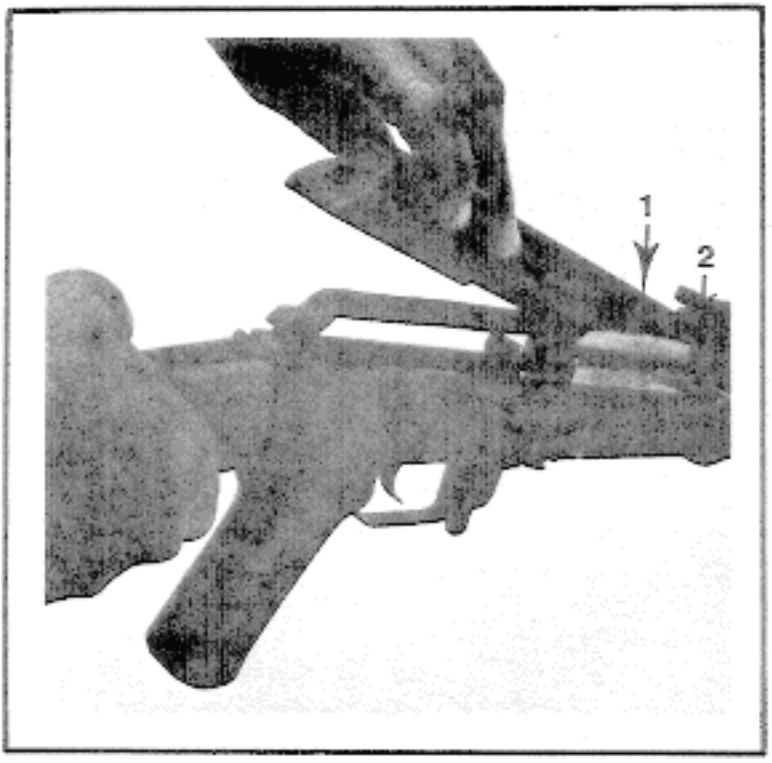

FIGURE 45. REPLACING BOLT COVER

1. FRONT OF COVER
2. CIRCULAR GROOVE

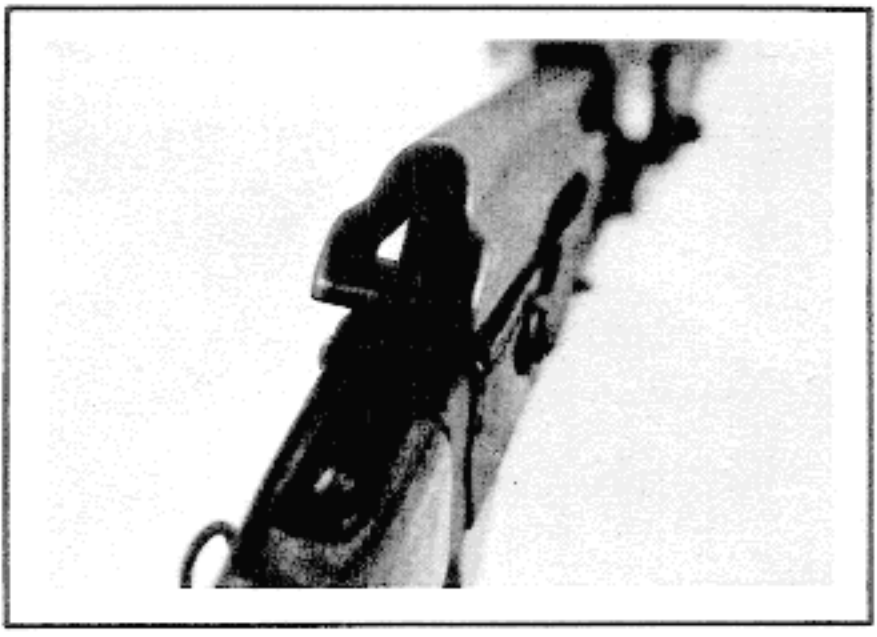

FIGURE 46. HOLE IN REAR OF COVER

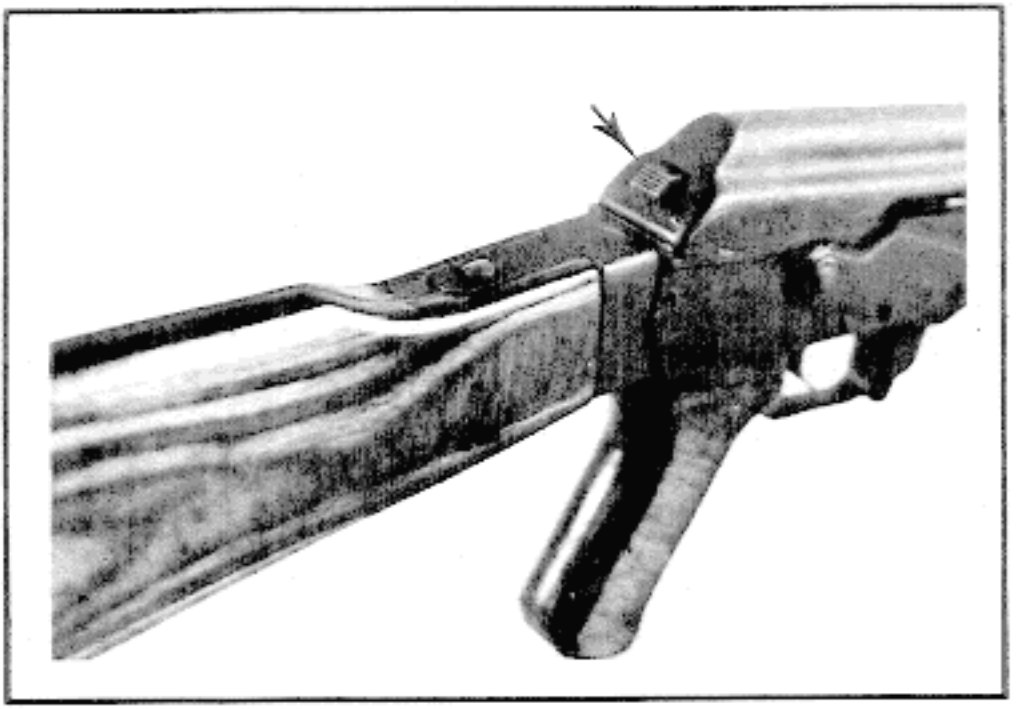

FIGURE 47. BOLT COVER SEATED

SECTION VI. ACCESSORIES

The following accessories will be issued when available with the AK-47: (fig 48).

1. Combination Tool Kit

2. Bayonet

3. Sling

4. Blank Firing Device

5. Night Sighting Device

Night Sighting Device: The night sighting device (fig 49) is attached by snapping it over the sight. It can be moved out of the way in order to use conventional sights in the daytime. To use this device, align the luminous dots (fig 50) over each other and on the target, aim and fire.

Blank firing device: The blank firing device is installed by pressing in the muzzle nut locking plunger (fig 51), unscrewing the muzzle nut by turning it clockwise and replacing it with the device (fig 52). It is removed the same way as the muzzle nut.

CAUTION: Only blank ammunition may be fired when the blank firing device is in place. Do not use the cap of the combination tool kit as a blank firing device.

Hand grenade launcher: The hand grenade launcher is installed by removing the muzzle nut (fig 53) and screwing the launcher onto the weapon (fig 54).

To fire the grenade, insert a grenade with the pin pulled into the launcher. CAUTION: A special type cartridge is used for firing the grenade. Place the butt of the weapon on the ground and fire from this position. The maximum effective range the grenade can be fired is 150 meters.

The bayonet (fig 55) is affixed by positioning its loops in front of the muzzle nut and gas cylinder body, and sliding the bayonet to the rear until the bayonet catch engages the muzzle nut (fig 56). The bayonet is removed by pulling the catch, located behind the hilt, away from the handle and sliding the bayonet forward and off.

Plastic magazine: The Soviet AK-47 metal magazine is gradually being replaced by the plastic magazine (fig 57) which is lighter than the metal. The plastic magazine, because it is light weight and waterproof, is used mainly by marines, airborne and armor units.

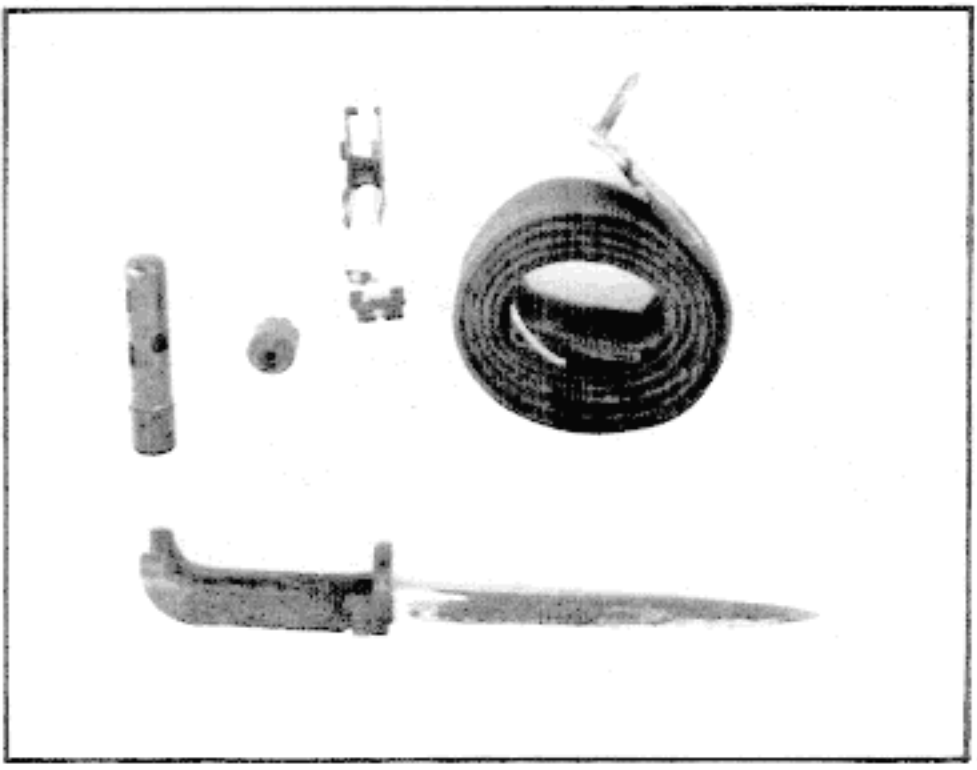

FIGURE 48. AK-47 ACCESSORIES

1. COMBINATION TOOL KIT
2. BAYONET
3. SLING
4. BLANK FIRING DEVICE
5. NIGHT SIGHTING DEVICE

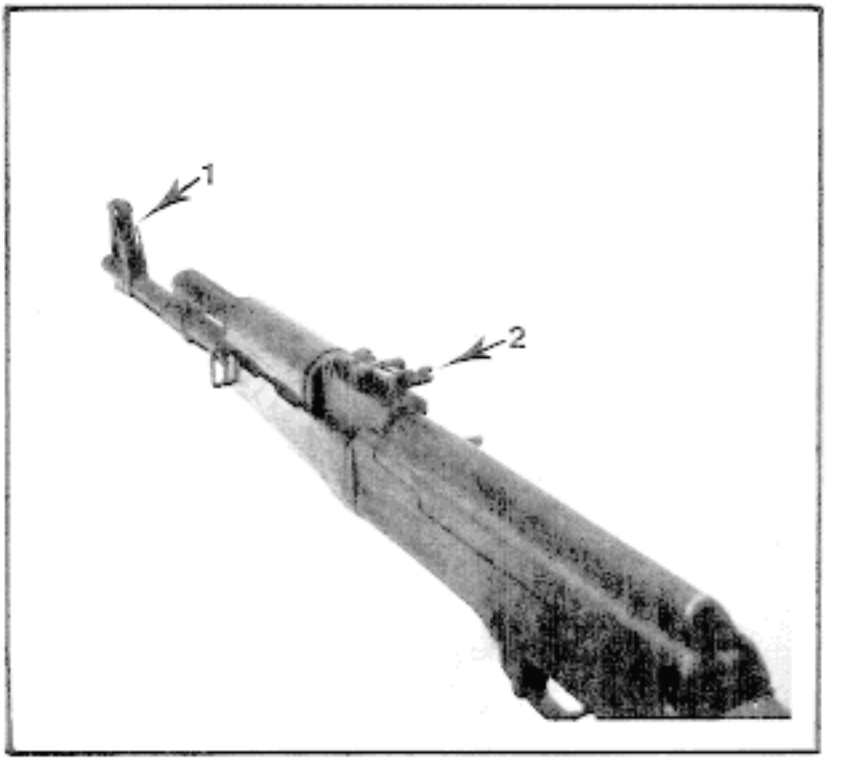

FIGURE 49. NIGHT SIGHTING DEVICE

1. FRONT
2. REAR

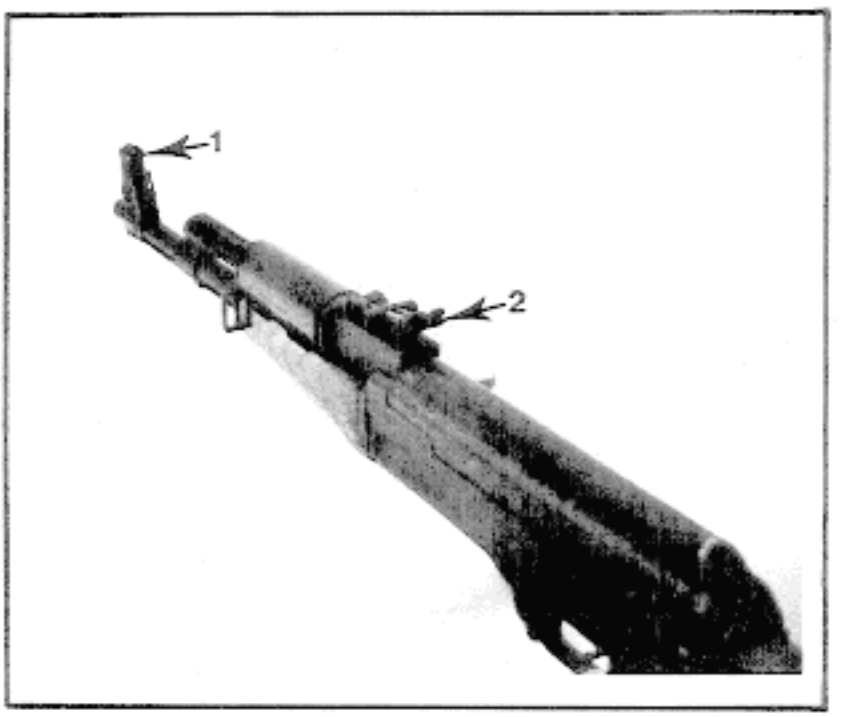

FIGURE 50. LUMINOUS DOTS

1. FRONT
2. REAR

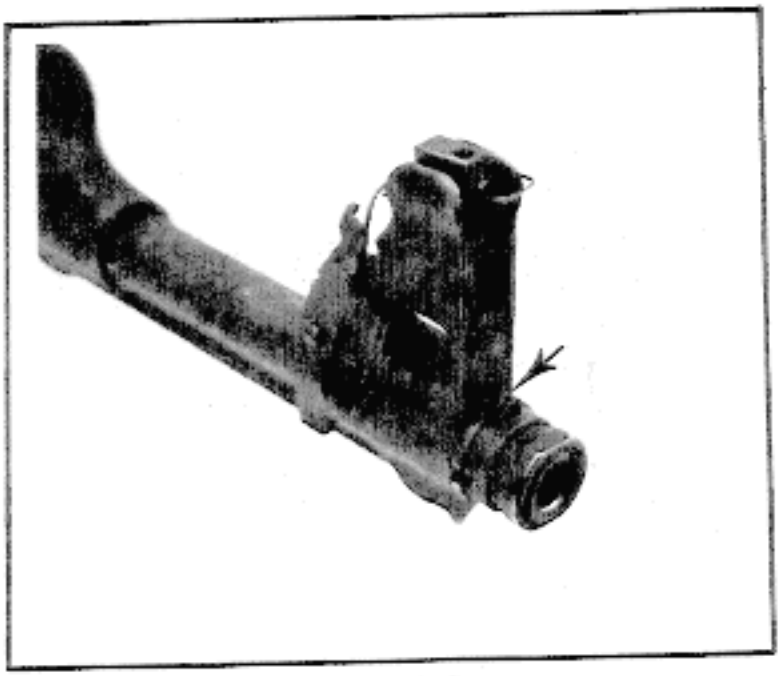

FIGURE 51. LOCKING PLUNGER

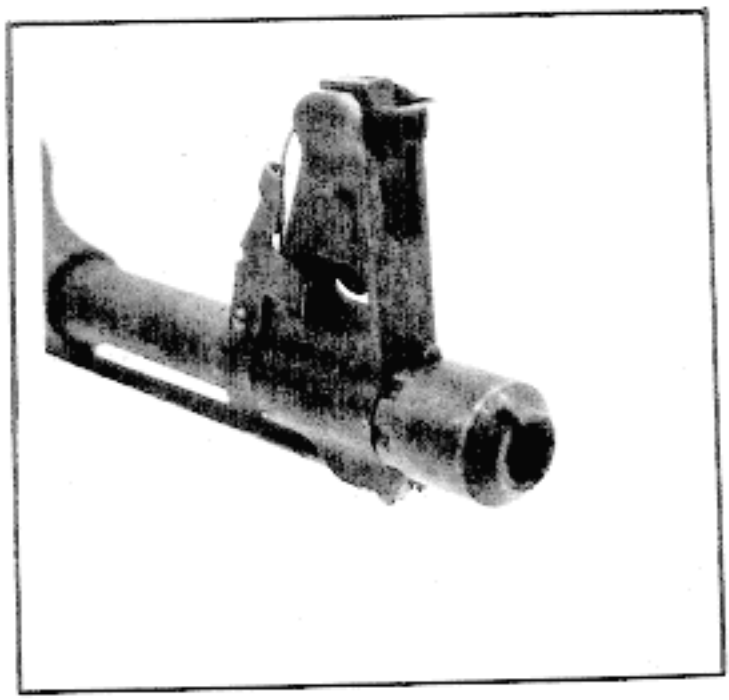

FIGURE 52. BLANK FIRING DEVICE

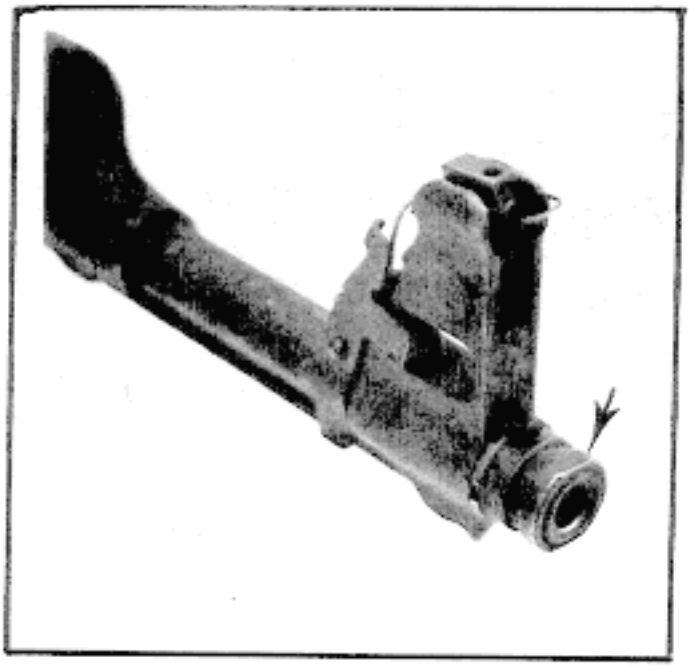

FIGURE 53. MUZZLE NUT

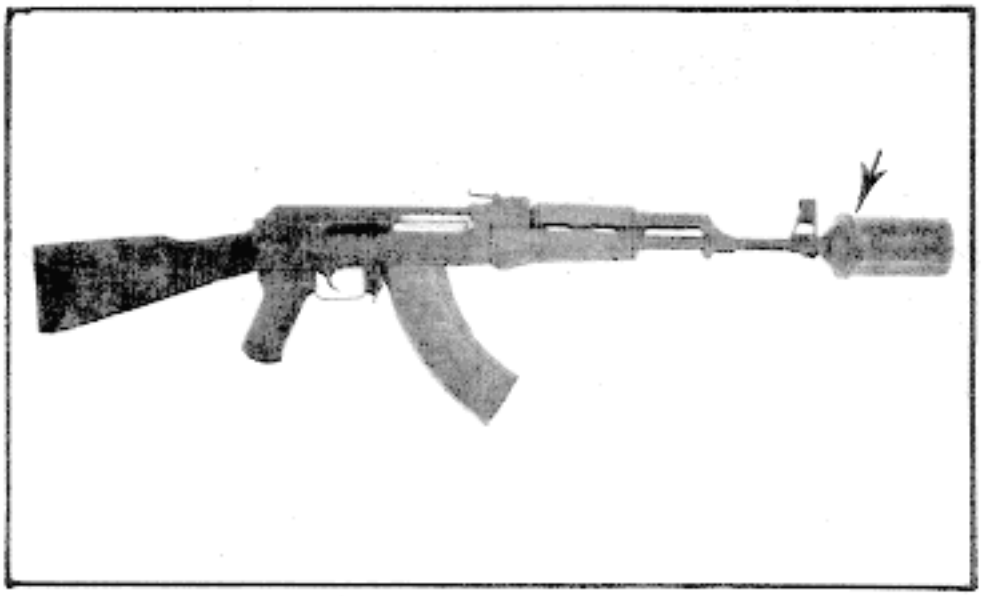

FIGURE 54. LAUNCHER

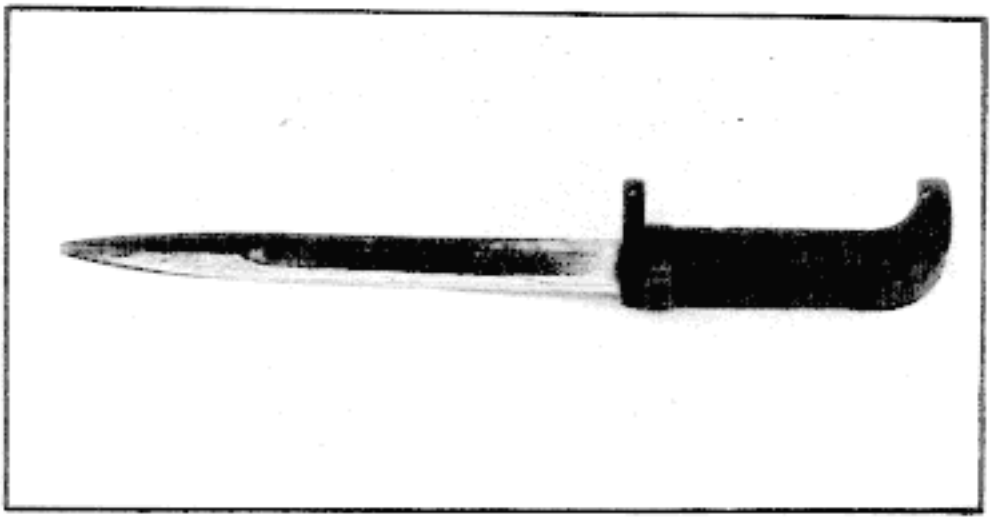

FIGURE 55. BAYONET

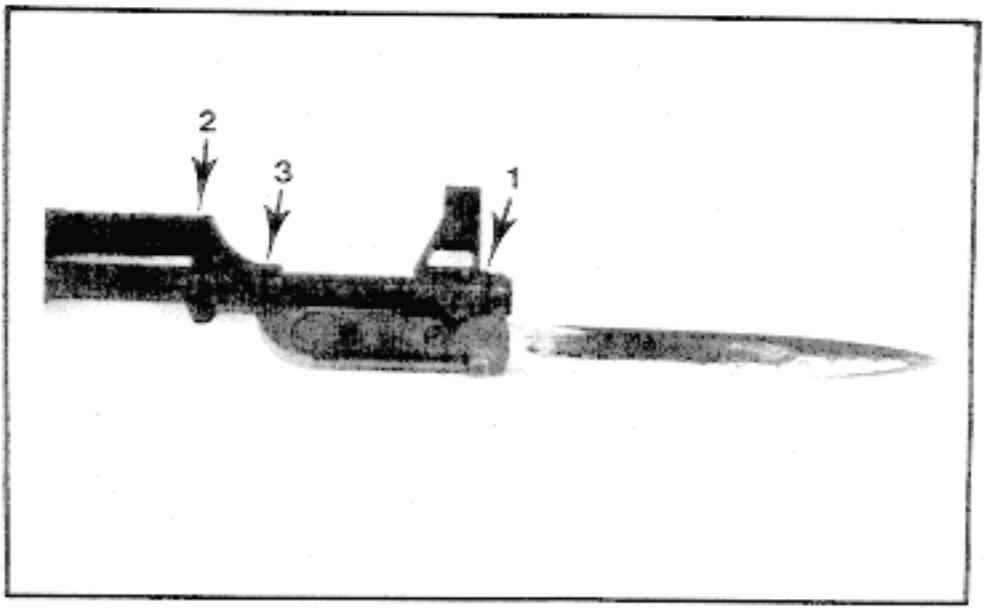

FIGURE 56. BAYONET

1. MUZZLE NUT
2. GAS TUBE
3. LOOP

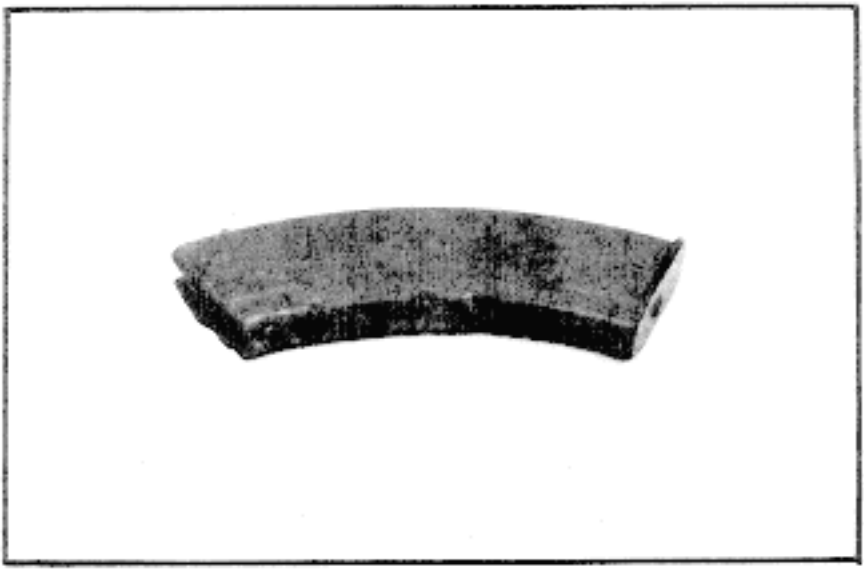

FIGURE 57. PLASTIC MAGAZINE

SECTION VII. MAINTENANCE

Care and cleaning: The AK-47 rifle must be kept in proper working order and be ready for action. This is achieved by timely and capable cleaning and lubricating.

The AK-47 assault rifle should be cleaned:

--- During preparation for firing.

--- After firing with ball and blank cartridges. The receiver, bore, chamber, gas piston, slide and bolt are cleaned and lubricated immediately after firing. Final cleaning takes place daily over the next three or four days.

--- During any combat situation and in extended exercise; daily during noncombat action periods.

--- No less than once a week if the rifle is not used. Oil should be placed only on well cleaned and dry metal surfaces immediately after cleaning so that moisture is not allowed to form on the metal.

SECTION VIII. SERVICE AND TRAINING AMMUNITION

The AK-47 automatic rifle fires the 7.62x39mm round, M1943. The rounds have varying construction depending upon their purpose. The weight of the bullets and their muzzle velocity are selected so that firing with the different bullets can be conducted with the same sight settings. Ammunition is divided into service and auxiliary types.

1. Service ammunition and its use

Service ammunition is divided into ball cartridges and special purpose cartridges.

Ball ammunition is used to engage enemy personnel.

Special ammunition, depending upon its construction, is designed for target indication and correction of fire, igniting fuel and highly inflammable objects, and for destroying lightly armored targets.

Tracer cartridges are designed for target indication, fire adjustment, signal purposes and engaging personnel. Tracer bullets can ignite straw roofs, dry grass, etc. The path of the bullet is indicated by a red flame. The flame can be seen for a distance of 700 meters.

AP-incendiary cartridges are used to destroy fuel (kerosene, gasoline) and for destroying targets protected by thin armor plating at ranges up to 300 meters.

Incendiary cartridges are used to destroy fuel in iron tanks up to 3 millimeters thick. Incendiary cartridges also contain a tracer element. The path of the bullet is indicated by a red flame which can be seen day or night. It can be seen for a distance up to 700 meters.

2. Training Ammunition, purpose and construction

Training ammunition includes drilled and blank 7.62mm rounds,M1943.

Drilled rounds are designed for training in loading and firing. On the body or the cartridge case there are longitudinal grooves, and on the cartridge case mouth there are marks from the clamping device. The primer is pierced. There is no propellant in the cartridge case.

Blank cartridges are designed for simulating fire and are used in tactical exercises. There is no bullet in the blank cartridges. The mouth is sealed by a star (rosette) crimp. It is dangerous to stand closer than 10 meters away from the muzzle face when blank cartridges are being fired.

BFI OP. MANUAL
PDF Version

WARNING: BEFORE USING THIS FIREARM,
READ AND FOLLOW THESE INSTRUCTIONS.

If there is anything you do not understand,
get help from someone qualified in the safe handling of firearms.

For all
BUSHMASTER
XM15 Models

OPERATING AND SAFETY INSTRUCTION MANUAL

A1 & A2 Sight Systems
All Rifles & Carbines
including V Match

PLEASE PRACTICE SAFE FIREARMS HANDLING!

This instructional manual should always accompany your Bushmaster firearm.

WARNING: **IF THIS FIREARM IS CARELESSLY OR IMPROPRERLY HANDLED, UNINTENTIONAL DISCHARGE COULD RESULT AND COULD CAUSE INJURY, DEATH, OR DAMAGE TO PROPERTY.**

CAUTION: **CAREFULLY READ THIS INSTRUCTION MANUAL PRIOR TO LOADING AND FIRING THIS FIREARM. FOLLOW ALL INSTRUCTIONS ON THE PROPER HANDLING AND SAFE USE OF THIS FIREARM - LIVES MAY DEPEND ON IT!** If unfamiliar with firearms, seek further advice through safe handling courses run by your local gun clubs, NRA approved instructor, or similar qualified organizations.

CAUTION: **USE ONLY CLEAN, DRY, HIGH QUALITY COMMERCIALLY MANUFACTURED AMMUNITION IN GOOD CONDITION** which is appropriate to the .223 Rem. caliber of your firearm. We do not recommend the use of remanufactured or hand loaded ammunition because it may damage your rifle. Use of improper ammunition will invalidate your warranty.

WARNING: **THIS WEAPON COULD CHAMBER A ROUND** if it is dropped or jarred with a loaded magazine in place - either with the Bolt Carrier Assembly locked to the rear, or in its forward position.

PLEASE PRACTICE SAFE FIREARMS HANDLING!

FUNDAMENTAL RULES FOR SAFE GUN HANDLING

ALWAYS KEEP THE GUN POINTED IN A SAFE DIRECTION.

NEVER LOAD THE GUN UNTIL READY TO USE.

KEEP YOUR FINGER OFF THE TRIGGER UNTIL READY TO SHOOT.

⚠ *WARNING:* BEWARE OF DANGEROUS PROCEDURES

• Be sure cam pin is installed in the bolt group. If it isn't, your rifle can still fire and ***will explode.***

• If you are using a ***blank firing attachment, never fire anything except blank rounds*** (for safety, we recommend the visible military style blank firing attachment).

• If your rifle stops firing with a live round in the chamber of a hot barrel (a misfire), ***remove the round fast***. However, if you cannot remove it within 10 seconds, remove magazine and wait 15 minutes ***with the rifle pointing in a safe direction***. This way you won't get hurt by a possible round "cooking-off" (i.e. the round detonating just from the heat of the barrel). In any event, keep your face away from the ejection port while clearing a hot chamber.

• If your bolt fails to unlock, and you try to free it by banging the buttstock on the ground, ***keep yourself clear of the muzzle.***

• If there's water in the barrel, do not fire the rifle. ***It could explode.***

• If a noticeable difference in sound or recoil is experienced, ***STOP FIRING.*** Either condition could indicate an incomplete powder burn and/or a bullet stuck in the bore.

ALWAYS PRACTICE SAFE FIREARMS HANDLING!

FACTS ABOUT YOUR BUSHMASTER XM15 E2S RIFLE…

The Bushmaster XM15 E2S rifle system consists of a rifle, a magazine, and a sling. It is a lightweight, gas operated, air-cooled, magazine-fed, shoulder-fired weapon that can be fired in a semi-automatic mode - i.e., a single shot each time the trigger is pulled.

• The upper receiver and barrel assembly has a fully adjustable rear sight.

• The upper and lower receivers are easily opened for cleaning and inspection.

• The bolt group and barrel extension are designed with locking lugs that lock the bolt group to the barrel extension.

• The forged aluminum upper and lower receivers reduce the weight of the rifle.

• The bore and chamber are chrome plated for long life and ease of maintenance.

• Caliber: .223 Remington / 5.56 mm

• Weight: (depends upon model) 20" Bbl. Rifle = 8.27 lbs. / 3.75 kg

• Length: (depends upon model) 20" Bbl. Rifle = 38.25" / 97cm

• Barrel Rifling: R.H. twist; 1 in 9"; 6 lands & grooves

• Firing characteristics: muzzle velocity approx. 3,260 fps; chamber pressure 52,000 psi

• Maximum effective rate of fire: 45 rounds per min. / semi-automatic

• Max effective range: 550 meters (individual/point targets) / 800 meters (area targets)

• Maximum range: 3534 meters

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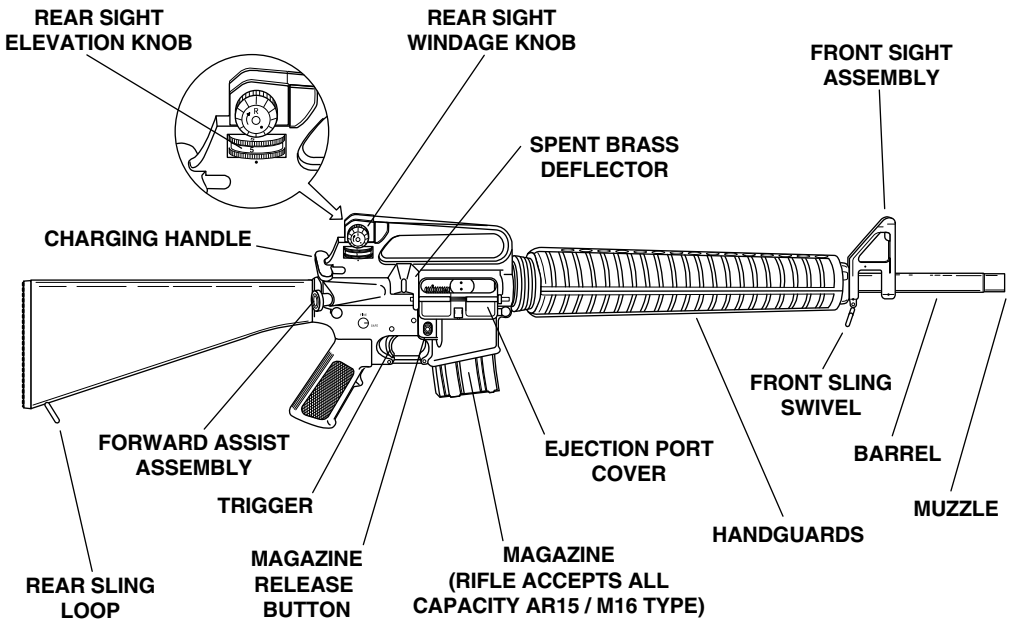
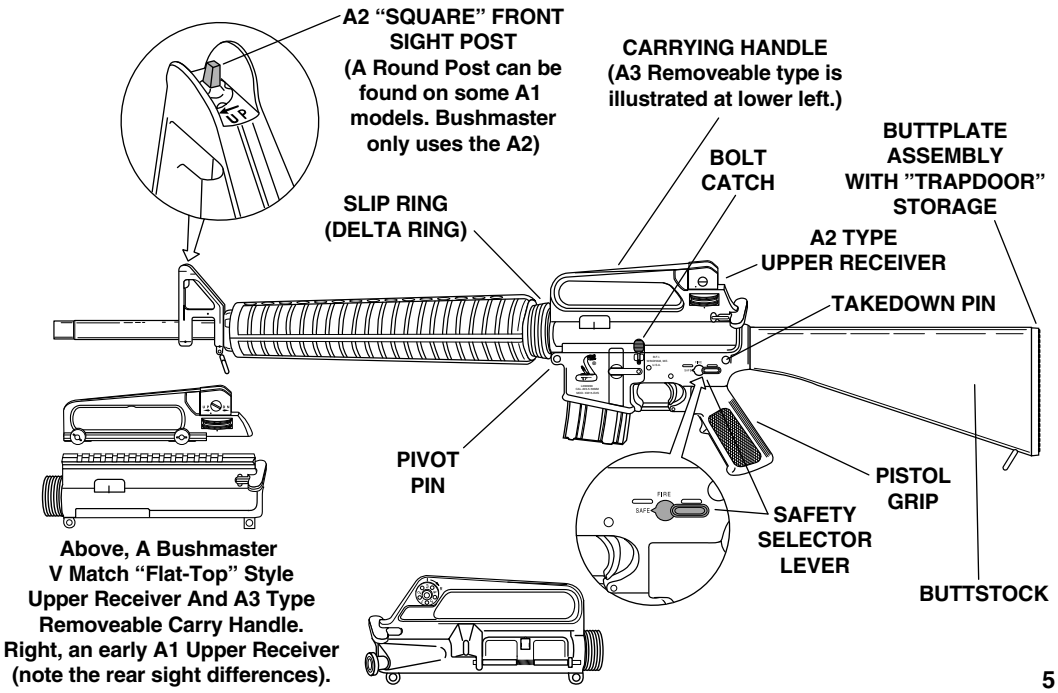
WARNING: BEFORE USING THIS FIREARM, READ AND FOLLOW THESE INSTRUCTIONS. If there is anything you do not understand, get help from someone qualified in the safe handling of firearms.

RIFLE PARTS AND WHERE TO FIND THEM (Right Side)…

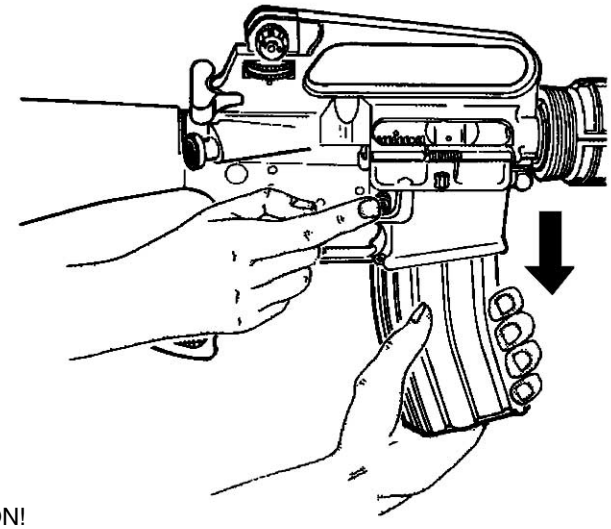


RIFLE PARTS AND WHERE TO FIND THEM (Left Side)…



Above, A Bushmaster V Match "Flat-Top" Style Upper Receiver And A3 Type Removeable Carry Handle. Right, an early A1 Upper Receiver (note the rear sight differences).

CLEARING YOUR RIFLE…

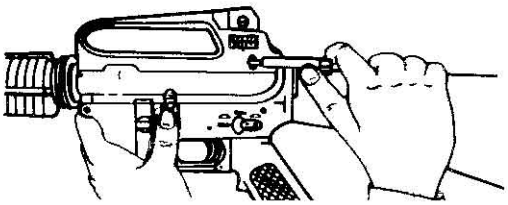


1.) Point Rifle in a SAFE DIRECTION! Place Safety Selector Lever on SAFE. (If the rifle is not cocked, the Selector Lever cannot be pointed toward SAFE.)

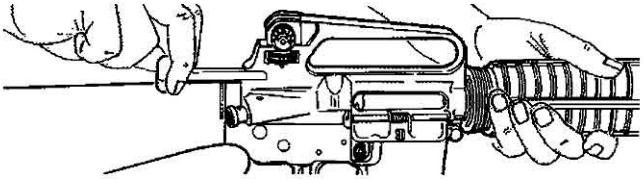
2.) Press Magazine Catch Button and pull Magazine down to remove.

CLEARING YOUR RIFLE (continued)…

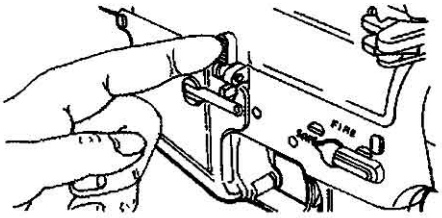
3.) To Lock Bolt Open, Pull Charging Handle rearward. Press bottom of Bolt Catch and allow Bolt to move forward until it engages Bolt Catch. Return Charging Handle to forward. If you haven't before, place Safety Selector Lever on SAFE.



4.) Check Receiver and Chamber to ensure there is no ammunition in the rifle.

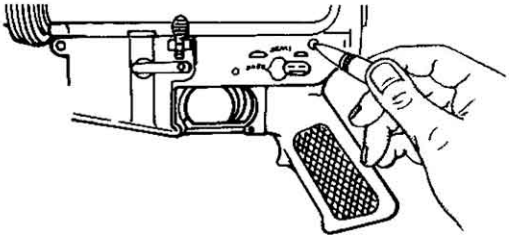


5.) With Selector Lever pointing toward SAFE, allow Bolt to go forward by pressing upper portion of Bolt Catch.

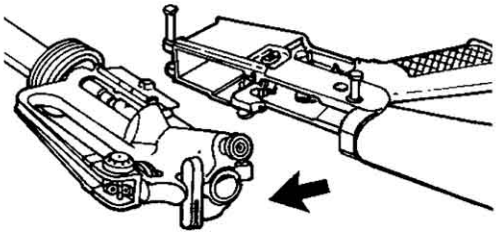


DISASSEMBLING YOUR RIFLE…

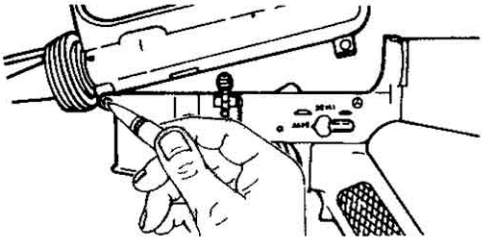
1.) Clear your Rifle and disconnect the Sling.



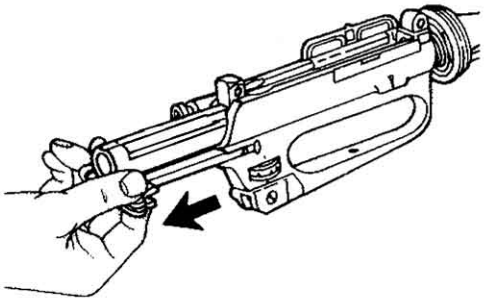
2.) Push in Takedown Pin as far as it will go. Pivot Upper Receiver away from Lower.



4.) Separate Upper and Lower Receivers.

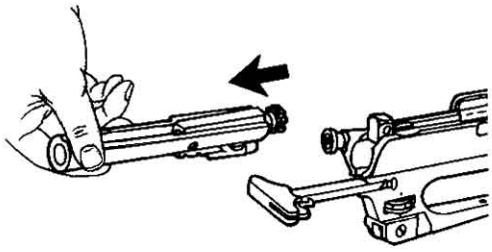


3.) Push in Front Pivot Pin.

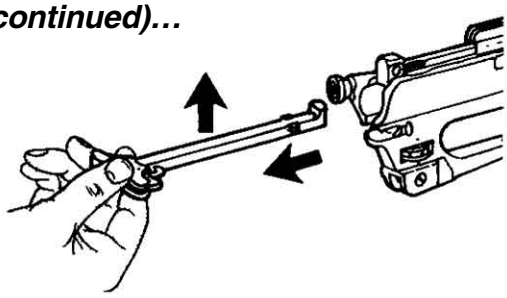


5.) Pull back Charging Handle and Bolt Carrier

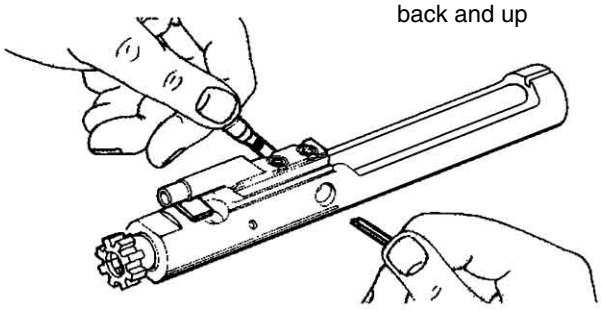
DISASSEMBLING YOUR RIFLE (continued)…



6.) Remove Bolt Carrier and Bolt



7.) Remove Charging Handle by pulling back and up

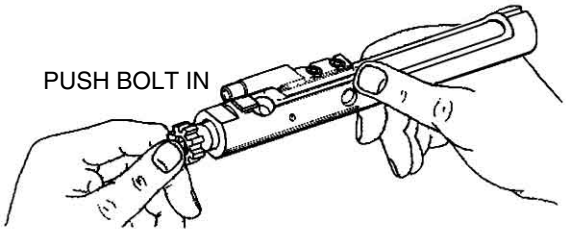


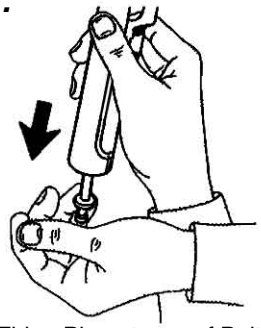
DO NOT OPEN OR CLOSE SPLIT END OF PIN

8.) Remove Firing Pin Retaining Pin.

DISASSEMBLING YOUR RIFLE (continued)…

9.) Push Bolt in to locked position.

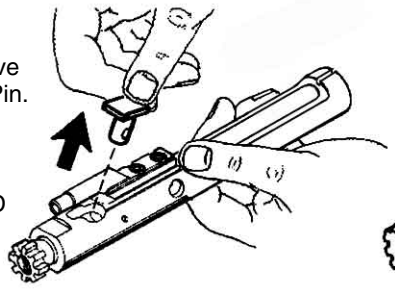


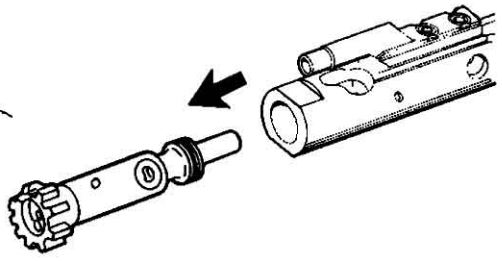


10.) Drop Firing Pin out rear of Bolt Carrier.

11.) Remove Bolt Cam Pin.

GIVE CAM PIN A 1/4 TURN AND LIFT OUT

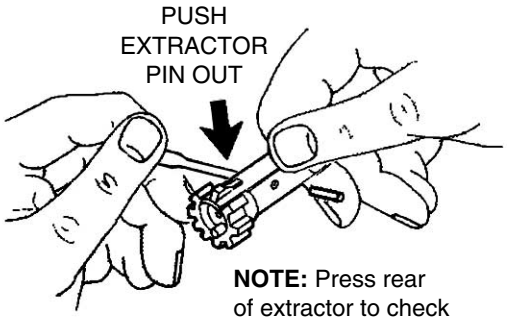




12.) Remove Bolt Assembly from Carrier.

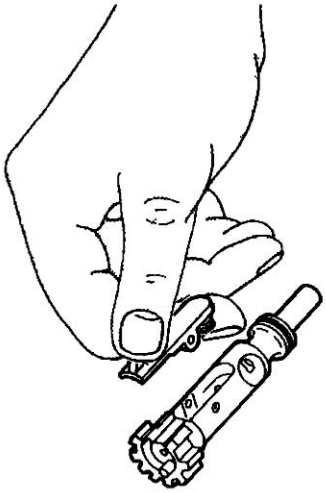
DISASSEMBLING YOUR RIFLE (continued)…

DISASSEMBLE USING STEPS 13 THRU 16 ONLY WHEN DIRTY OR DAMAGED



NOTE: Press rear of extractor to check spring function.

13.) Remove Extractor Pin by pushing out with a punch or the tip of a bullet.

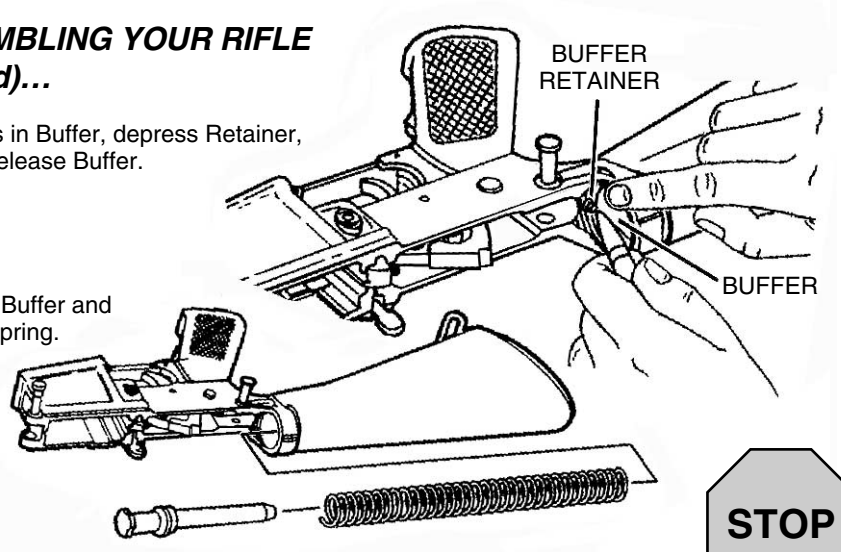


14.) Remove Extractor and Spring.
CAUTION: Extractor Spring may pop out and get lost!

DISASSEMBLING YOUR RIFLE (continued)…

15.) Press in Buffer, depress Retainer, and release Buffer.

16.) Remove Buffer and Action Spring.



The **Handguards** may be disassembled at any point in your cleaning procedures as necessary (see Pg. 27 - "Buddy System" instructions).

If your Rifle is equipped with the **A3 Type Removeable Carry Handle**, that may be removed for cleaning by loosening the 2 thumbnuts. Clean as per instructions for aluminum Upper and Lower Receivers (see Pg. 16). Lightly lubricate the thumbnut threads and the Rear Sight mechanism (as described on Pg. 21 - Lubrication - Adjustable Rear Sight).

BUSHMASTER DOES NOT RECOMMEND ANY FURTHER DISASSEMBLY

CLEANING • INSPECTION • LUBRICATION…

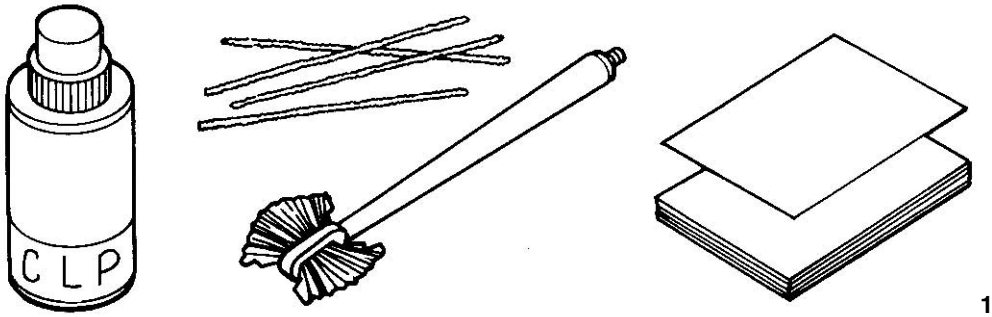
After firing, clean your rifle as soon as possible to make the job easier and to avoid allowing the development of any corrosion.

When your firearm has not been fired, you should clean it at least once or twice a year if you live in a temperate climate, or as often as once a week in a tropical climate.

If you get your firearm wet, clean it as soon as possible.

Use a high quality rifle cleaning kit that includes a cleaning rod; swab holder; cotton flannel bore patches; pipe cleaners; a small toothbrush; brass wire bristle bore and chamber brushes and a Cleaner/Lubricant/Preservative (CLP in Army terminology).

After you have disassembled the rifle, thoroughly clean, inspect and lubricate all parts according to the techniques described on following pages.



DETAILED CLEANING TECHNIQUES…

NOTE: The procedures below describe cleaning with a standard military issue multi-piece rod cleaning kit. Other commercial cleaning kits may include alternate cleaning instructions which may be just as effective.

CLEANING THE BORE: The bore of your Bushmaster rifle has lands and grooves called rifling. Rifling makes the bullet spin very fast as it moves down the bore and down range. It is difficult to ***push*** a new, stiff bore brush through the bore. You will find it much easier, and more effective, to ***pull your bore brush through the bore***. Also, because the brush will clean better if the bristles follow the grooves (this is called tracking), you want the bore brush to be allowed to turn as you pull it through. Always clean from from chamber toward the muzzle. This is how you do it:

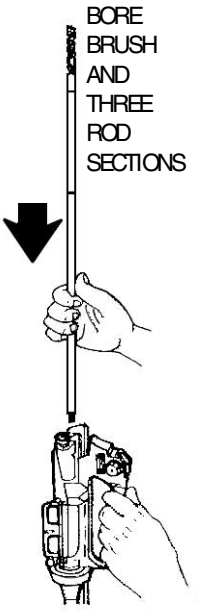
1.) Swab out the bore with a patch moistened with “CLP”.

2.) Attach three rod sections together but leave each one about two turns short of being tight.

3.) Attach the bore brush but leave it two turns short also.

4.) Point muzzle down. Hold the upper receiver in one hand while inserting the end of the rod ***without the brush*** into the chamber. Guide the rod carefully through the bore. ***CAUTION - do not let the rod or its threaded end scratch the Chrome Lining of the Bore or Firing Chamber.***

About 2 - 3 inches of the rod should protrude out of the muzzle.



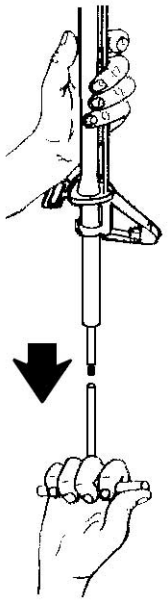
DETAILED CLEANING TECHNIQUES (continued)…

5.) Attach the handle section of the cleaning rod to the end of the rod sticking out of the muzzle.

6.) Pull the brush through the bore and out the muzzle. You should be able to see the rod twisting as you pull it - this is the brush "tracking" in the rifling. ***Never reverse the direction of the bore brush while it is in the bore.***

7.) After one pull, take off the handle section and repeat the process. After three or four pulls, the three rod sections and the bore brush may become screwed tightly together. Loosen them up and repeat the process.

8.) Send a patch through the bore occasionally to help clean out the crud that the brush is getting loose. Just replace the bore brush with the rod tip (patch holder) and a wet patch. Pull it through. If you leave the rods loose again, the patch will "track" in the rifling as before. But remember, always have the bore ***wet with cleaner*** before trying to pull a brush through.



ATTACH HANDLE AND PULL THROUGH FROM CHAMBER TO MUZZLE

CLEANING THE UPPER RECEIVER…

NOTE: Check to ensure that there is no looseness between the Barrel and the Upper Receiver - if you detect any movement by twisting with your hands, the barrel nut must be retorqued. Bring the Rifle to a qualified gunsmith.

1.) Using a "CLP" type product, clean all areas of Powder Fouling, Corrosion, Dirt and Rust. Never use a wire brush or any type of abrasive to clean the Aluminum Upper Receiver - you'll scratch and damage the finish.

CLEANING THE UPPER RECEIVER (continued)…

2.) Clean the Firing Chamber - dip the larger chamber cleaning brush in CLP and use at least five plunge strokes and three 360 clockwise rotations. Then swab out the bore as described previously to remove any contaminated solution or loosened crud.

3.) Use the bore cleaning brush, still wet with CLP, and clean carbon and powder residue from around the gas tube, run a pipe cleaner into the gas tube, clean the bolt locking lugs, bolt rings, firing pin, bolt cam pin, lip of the extractor, and inside the bolt carrier from both front and rear.

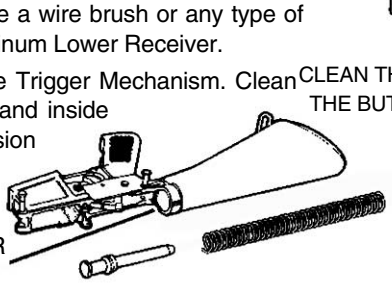
4.) Wipe all components clean and dry, and inspect for excessive wear, corrosion or mechanical damage. Replace any defective parts before firing again (call us at 1-800-998-SWAT for any parts needs.)

A SMALL TOOTHBRUSH WILL REMOVE BUILT-UP DIRT

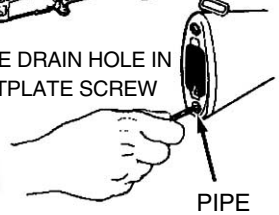
CLEANING THE LOWER RECEIVER…

1.) Clean all areas of Powder Fouling, Corrosion, Dirt and Rust. Again, never use a wire brush or any type of abrasive to clean the Aluminum Lower Receiver.

2.) Wipe any dirt from the Trigger Mechanism. Clean the Buffer, Action Spring, and inside the Lower Receiver Extension (the Buffer Tube).



WIPE INSIDE OF BUFFER TUBE CLEAN



CLEAN THE DRAIN HOLE IN THE BUTTPLATE SCREW

PIPE CLEANER

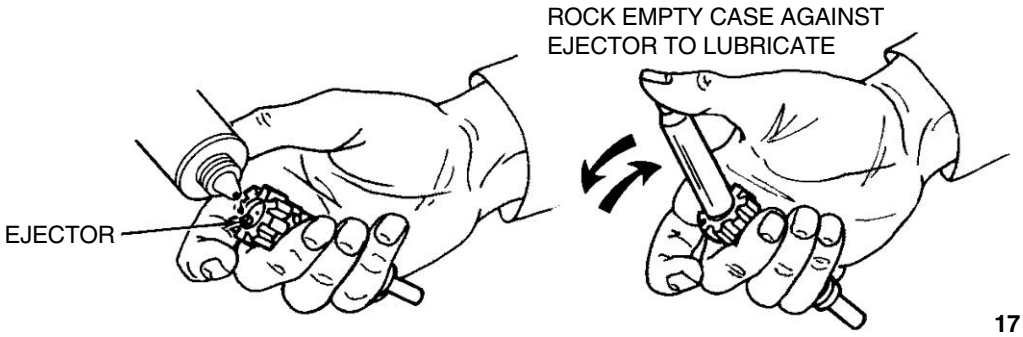
CLEANING THE EJECTOR…

The design of the Ejector makes its disassembly for cleaning somewhat impractical (i.e. we don't recommend it). Make sure your Bushmaster ejects empty cases efficiently by following these steps on a monthly basis (more frequently if firing blanks).

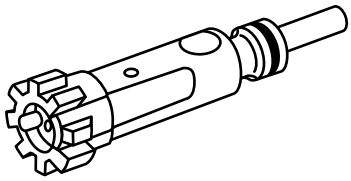
1.) Remove the Bolt from the Carrier (as described on previous pages). Hold it as shown with the Ejector down and the Extractor up.

2.) Dribble a few drops of CLP around the Ejector to form a puddle.

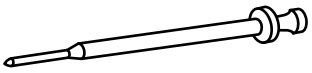
3.) Take a fired or dummy case and place it under the lip of the Extractor. With a rocking motion, press the case down against the Ejector. Since the Ejector is spring loaded, some resistance will be felt. Press on the case until it stops against the bolt face. Ease off with your thumb slightly and press down again. Repeat several times. ***Replace the CLP frequently.*** Once the spring action of the Ejector is smooth and strong, dry off any excess.



INSPECTION - Before Lubricating…



1.) Check the Bolt: Look for cracks or fractures, especially in the cam pin hole area. Bolts with pitting that extends into the firing pin hole should be replaced.

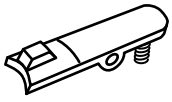


2.) Check the Firing Pin: If it is bent, cracked, too blunted or too sharp, it should be replaced.

3.) Check the Firing Pin Retaining Pin: If it is bent, or badly worn, it should be replaced.

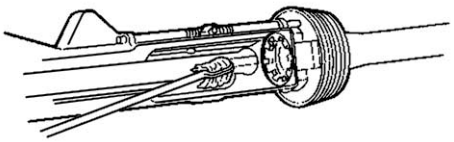
4.) Check the Cam Pin: If it is cracked, or chipped, it should be replaced.

WARNING: IF THE CAM PIN IS MISSING, DO NOT FIRE THE RIFLE - IT WILL EXPLODE.

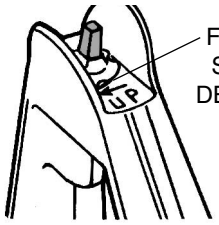


5.) Check the Extractor and Extractor Spring: If the Extractor is chipped, or has broken edges in the area of the lip that engages the cartridge rim, it should be replaced. Check that the rubber insert is inside the Extractor Spring.

LUBRICATION - Upper Receiver…



Lightly lubricate the inside of upper receiver, the bore and chamber (using the cleaning rod and a patch), the outer surfaces of barrel and front sight, and surfaces under the handguard. Be sure you lube in and around all the ***Locking Lugs*** (see illustration at right).



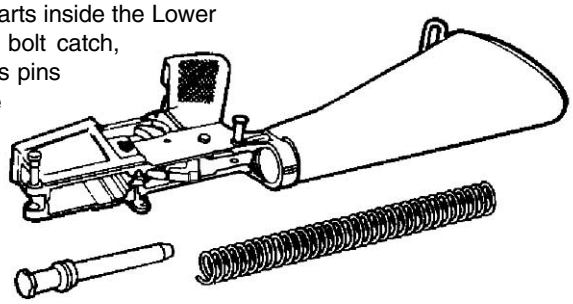
FRONT SIGHT DETENT

Depress the ***Front Sight Detent*** and apply two or three drops of CLP to it. Depress the detent several times to work the lubricant into the spring.

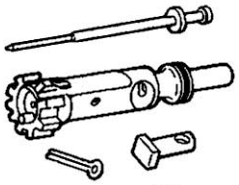
LUBRICATION - Lower Receiver…

Lightly lubricate inside the Lower Receiver Extension (Buffer Tube), the Buffer and the Action Spring.

Generously lubricate all moving parts inside the Lower Receiver (trigger, hammer, safety, bolt catch, forward assist, etc), and their various pins and detents. Don't forget the Takedown and Pivot Pins and their detents. Wipe any fingerprints (they can start the corrosion process) off the exterior surfaces with an oiled rag - a black cloth is best as it won't leave visible lint.

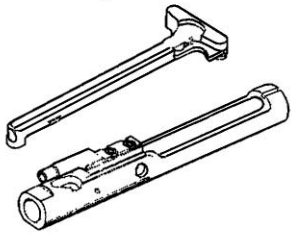


LUBRICATION - Bolt Carrier Group…



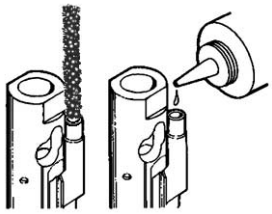
Lightly lubricate the Firing Pin with CLP - also the Firing Pin recess in the Bolt.

Generously lubricate the Bolt, its Cam Pin area, the Bolt Gas Rings. A lighter application is good on the Extractor and its Pin.



Lightly lubricate the Charging Handle and the inner and outer surfaces of the Bolt Carrier.

Generously lubricate the slide and Cam Pin area of the Bolt Carrier.



The inside of the ***Carrier Key*** on the Bolt Carrier should be dried with a Pipe Cleaner - then place one drop of CLP inside.

LUBRICATION - Adjustable Rear Sight…

Note: Record how far you move the rear sight so it can be returned to its original position upon the completion of this task.

Rear Sight Moving Parts: Use 1 or 2 drops of CLP. Rotate these parts to ensure that the lubricant is spread evenly above, below and around the threads of the:

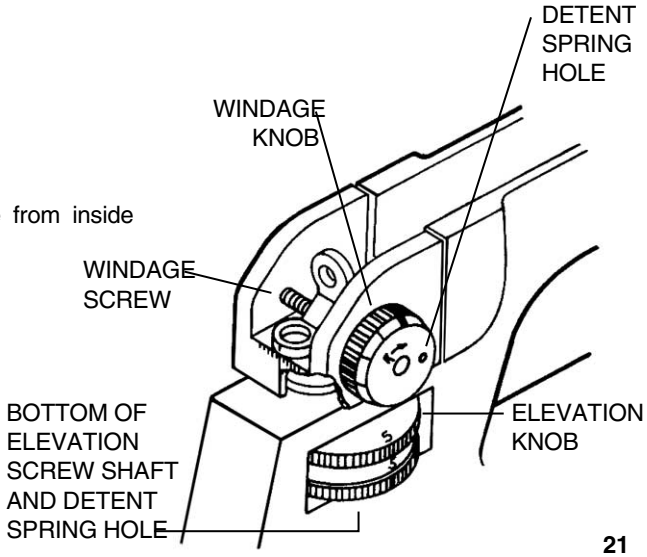
1.) Elevation knob

2.) Elevation screw shaft

3.) Windage knob

4.) Windage screw

5.) Detent holes



Elevation Screw Shaft: Also lube from inside the upper receiver as follows:

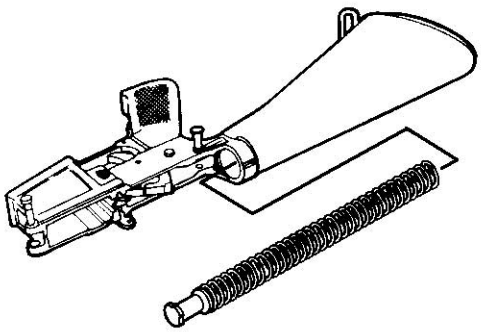
1.) Turn upper receiver upside down

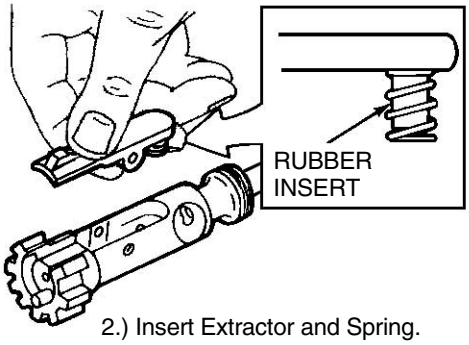
2.) Remove charging handle

3.) Put 2 or 3 drops on bottom of elevation screw shaft and in elevation detent spring hole

4.) Rotate the elevation dial back and forth a few times while keeping upper receiver upside-down

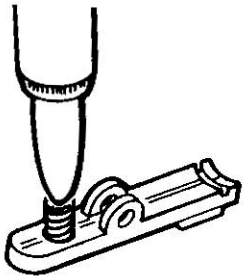
REASSEMBLY…





2.) Insert Extractor and Spring.

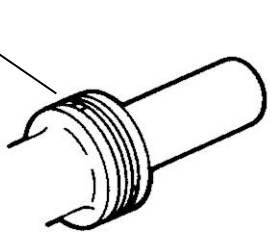
1.) Insert Action Spring and Buffer. Depress Buffer Detent. and push Buffer in past the Detent, then release.

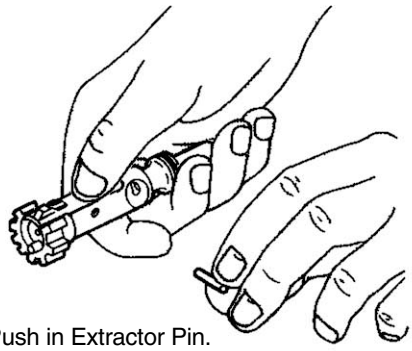


Note: Extractor Assembly has a Rubber Insert within the Spring. Be sure not to lose it. If the Spring comes loose, put the large end of the spring in the extractor and seat it (a bullet tip works well).

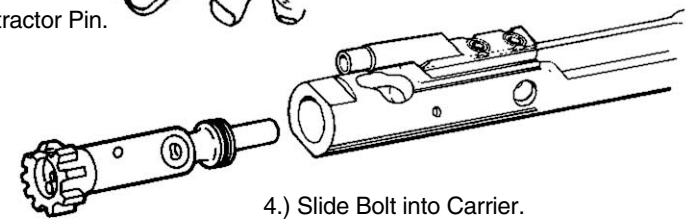
REASSEMBLY (continued)…

STAGGER THE GAS RING GAPS
TO REDUCE GAS LOSS. Position the three ring gaps 120 apart around the bolt.





3.) Push in Extractor Pin.

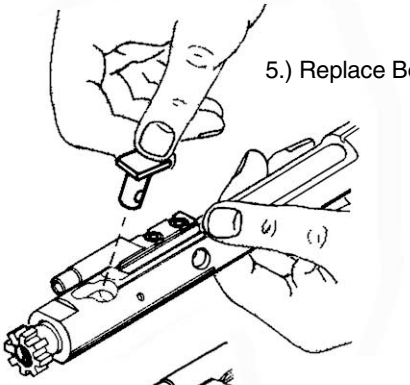


4.) Slide Bolt into Carrier.

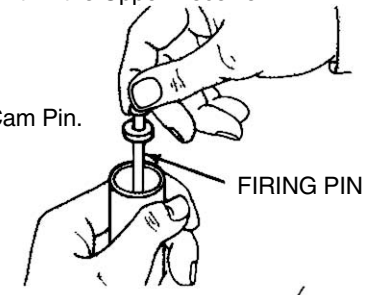
REASSEMBLY (continued)…

WARNING: Be sure the Cam Pin is installed in the Bolt Group. If it isn't, your rifle can still fire and will explode!

NOTE: The Bolt is machined so as to allow insertion of the Cam Pin from one side only. This provision aligns the Extractor and Ejector properly within the Upper Receiver.

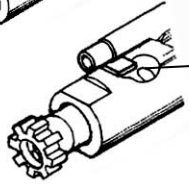


5.) Replace Bolt Cam Pin.

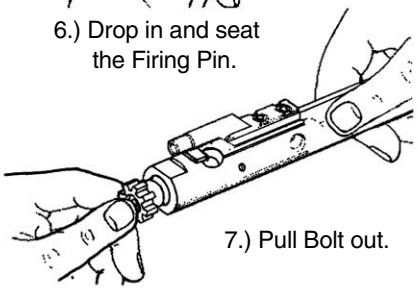


FIRING PIN

6.) Drop in and seat the Firing Pin.



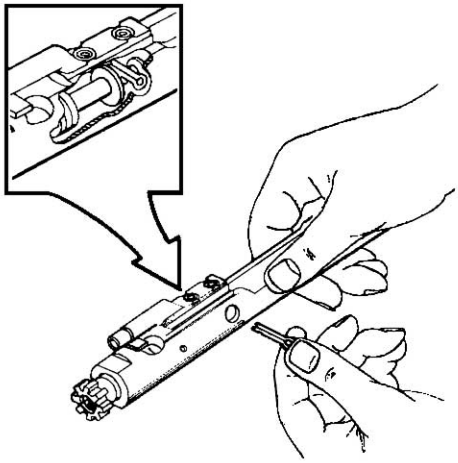
GIVE CAM PIN A 1/4 TURN AFTER INSERTION



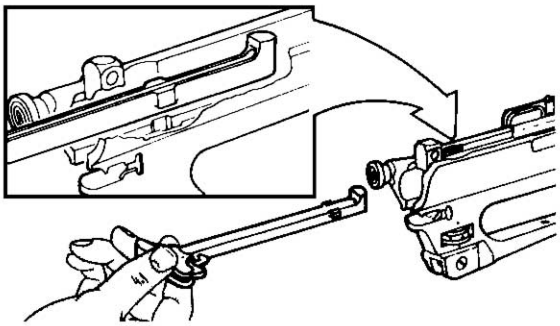
7.) Pull Bolt out.

REASSEMBLY (continued)…

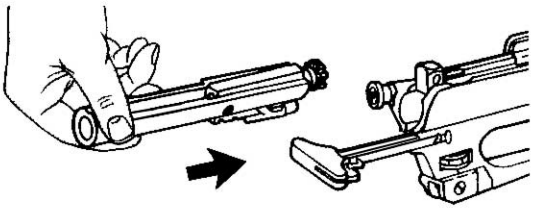
NOTE: Firing Pin should not fall out when Bolt Carrier Group is turned upside down.



8.) Replace Firing Pin Retaining Pin.



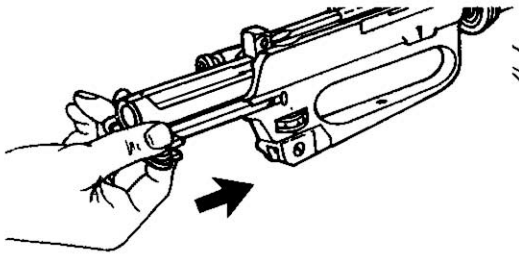
9.) Engage, then push Charging Handle part way.



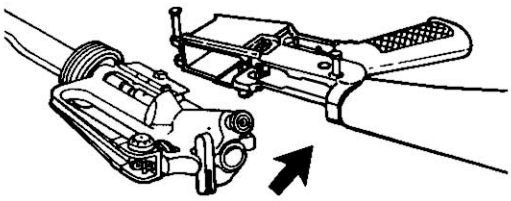
10.) Position Carrier Key in slotted bottom of Charging Handle. Slide in Bolt Carrier Group.

CAUTION: Bushmaster does not recommend the practice of swapping bolts between different rifles. Doing so could result in damage, personal injury or death.

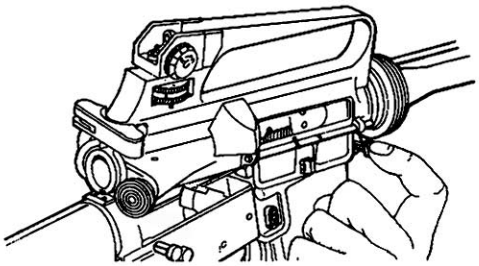
REASSEMBLY (continued)…



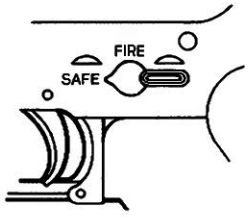
11.) Push Charging Handle and Bolt Carrier group into receiver together.



12.) Join Upper and Lower Receivers.



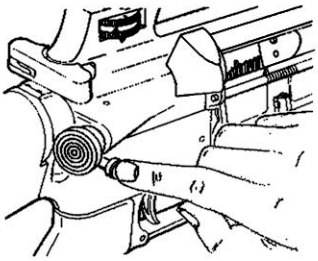
13.) Engage Receiver Pivot Pin.



CAUTION: Selector Lever should be on SAFE before closing Upper Receiver.

REASSEMBLY (continued)…

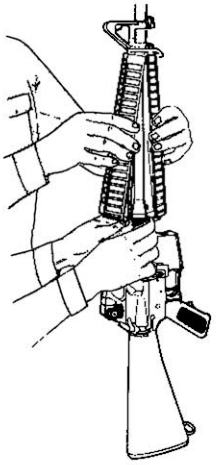
14.) Close the Upper and Lower Receiver groups and push in the Takedown Pin.

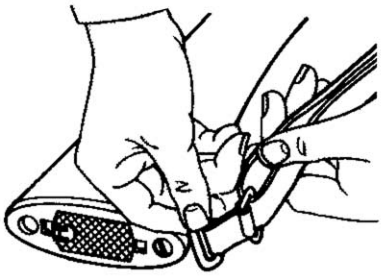


When re-attaching the Handguards, use ***The "Buddy System":***

15.) Place the Rifle on the Buttstock and press down on the Slip Ring with both hands. ***Note:*** The "Half-Round" Handguards are identical and can be used on top or bottom.

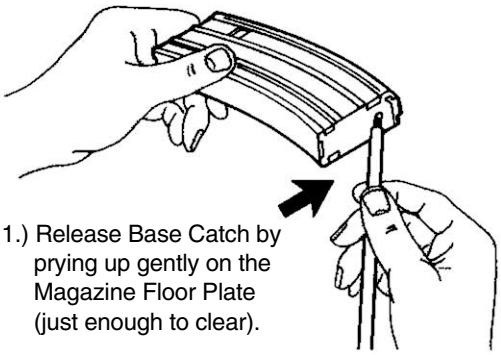
16.) Have your buddy install one handguard on top and the other on the bottom.



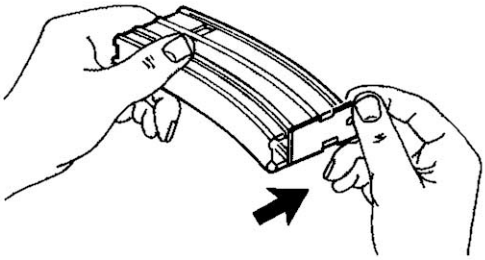


17.) Re-attach the Sling.

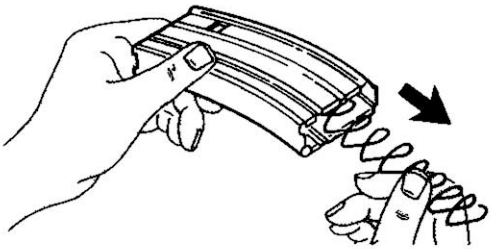
MAGAZINE DISASSEMBLY / REASSEMBLY …



1.) Release Base Catch by prying up gently on the Magazine Floor Plate (just enough to clear).



2.) Remove Magazine Floor Plate by sliding it out of the Magazine Body.



3.) Jiggle Spring and Follower to remove. Do not remove the Follower from the Spring.

TO CLEAN and LUBRICATE, Wipe dirt from Magazine Body, Spring, and Follower. Then lightly lubricate the Spring.

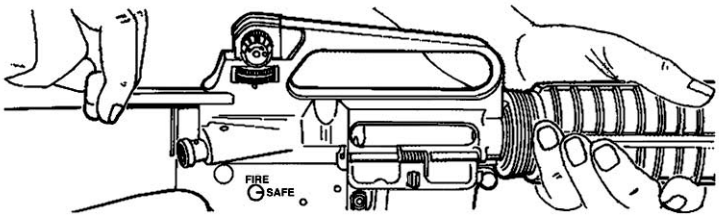
REASSEMBLY is reverse of steps above. Make sure to slide the base under all four tabs until it snaps back under the catch.

PREVENTATIVE MAINTENANCE CHECKS & SERVICES…

CHECK BEFORE YOU FIRE! …

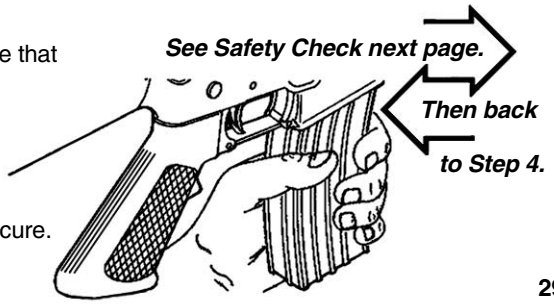
1.) Check to see that there is no excessive oil in the Bore. If there is, swab it out with a patch and the cleaning rod.

2.) Retract the Bolt to ensure free movement between Bolt Carrier and Gas Tube.



3.) Perform Safety Function Check to ensure that Safety Selector Lever works properly.

4.) Check to ensure that the Magazine is secure.



SAFETY FUNCTION CHECK…
UNLOAD RIFLE - REMOVE MAGAZINE - CHECK CHAMBER

1.) Remove magazine if installed. Pull Charging Handle assembly to rear. Check that Chamber is clear. Let Bolt and Bolt Carrier close. Do not pull Trigger. Leave Hammer in cocked position.

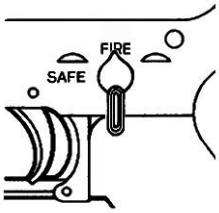
WARNING: If Rifle fails any of the following tests, continued use of the Rifle could result in injury to, or death of, personnel.

2.) Place Selector Lever in SAFE position and pull Trigger. ***THE HAMMER SHOULD NOT FALL.***

3.) Place Selector Lever in FIRE position. Pull trigger. ***THE HAMMER SHOULD FALL.***

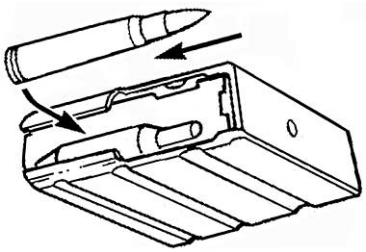
NOTE: For the purpose of the following check, "SLOW" is defined as one fourth to one half the normal rate of trigger release.

4.) Hold Trigger to the rear, pull Charging Handle to the rear, and release pressure on the Trigger with a slow, smooth motion, without hesitations or stops, until the Trigger is fully forward. ***AN AUDIBLE CLICK SHOULD BE HEARD - THE HAMMER SHOULD NOT FALL.***



5.) Repeat the FIRE position test five times. The Rifle must not malfunction during any of these five tests. If the Rifle malfunctions during any of these five tests, have the Rifle checked by a qualified gunsmith.

LOADING A MAGAZINE…



1.) Use only quality ammunition suitable for your firearm. Examine each cartridge - particularly around the primer. Look for dents, scratches, and other signs of damage. ***Do not load damaged ammunition.***

2.) With the magazine facing forward as shown in the illustration, place a round between the lips of the magazine with the bullet tip forward. Push the round down until it is held by the magazine lips.

3.) If necessary, give the round a slight push backward to seat it against the back edge of the magazine lips. Place next round on top of previous round and repeat steps until desired number of rounds is loaded.

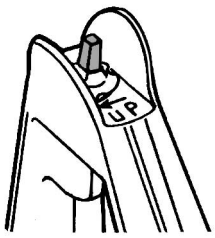
CAUTION: Safe firearms handling dictates that you ONLY LOAD LIVE AMMUNITION INTO YOUR RIFLE WHEN YOU ARE ABOUT TO SHOOT.

THE FORWARD ASSIST…

The forward assist helps lock the bolt into the barrel, but it will only be useful on rare occasions when the bolt fails to lock automatically. If you find that you need to use the forward assist, it is probably time you cleaned your rifle - pay particular attention to the locking lug areas in the chamber and on the bolt.

CAUTION: ALWAYS CHECK THAT AMMUNITION IS CLEAN AND UNDAMAGED BEFORE USING THE FORWARD ASSIST. Forcing dirty or damaged ammunition into the chamber could damage your rifle and could result in injury, death or property damage.

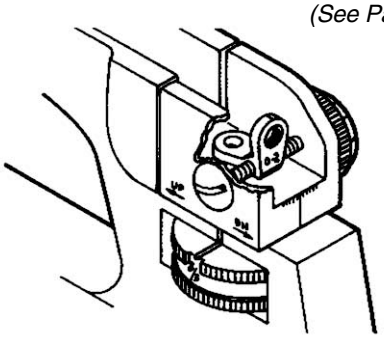
ADJUSTABLE FRONT SIGHT POST…



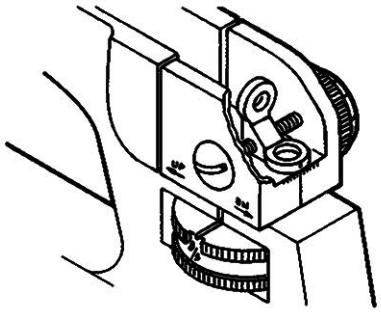
The Front Sight Post is moved up and down when "Zeroing" the Rear Sight. Once the Rear Sight is zeroed, the Front Sight Post should not be moved.

A2 DUAL APERTURE REAR SIGHT…

(See Page 36 for A1 Sight information)

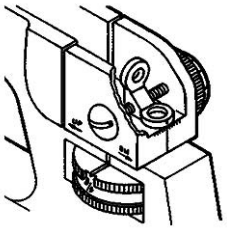


SHORT RANGE - This "larger" aperture is used for 0 - 200 meters range. As shown above, the sight is set tor 0 - 200 meters. This larger aperture is only used when the **8/3** marking is aligned with the vertical mark on the left side of the upper receiver.



NORMAL RANGE - The smaller aperture is unmarked and is used for most firing situations. It is used in conjunction with the elevation knob for 300, 400, 500, 600, 700, and 800 meter targets.

ZEROING YOUR SIGHTS…



300 METERS
ON THE
ELEVATION KNOB
(dial rotated down)

This is the procedure to follow in order to "Zero" your mechanical sights.

1.) In this procedure, the Front Sight Post and Rear Sight Windage Knob are adjusted so that you can hit your point of aim at 300 meters:

2.) Flip the unmarked (smaller) aperture to the up position (as shown).

3.).Set the Rear Sight so that the 300-meter mark is aligned with the mark on the left side of the receiver.

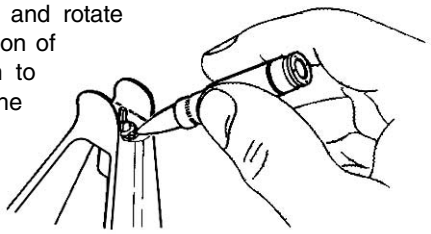
ZEROING ADJUSTMENTS…

1.) During zeroing procedures, only the front sight post and windage knob are adjusted to move the strike of the bullet on the target.

2.) If you are zeroing on a 25-meter range, the rear sight elevation knob is adjusted to the 300-meter mark plus one "click" up.

3.). Also see the detailed zeroing procedures on the following pages.

FRONT SIGHT: To adjust elevation, depress detent and rotate post. To raise strike of bullet, rotate post in the direction of arrow marked UP. Reverse the direction of rotation to lower strike of bullet. Each graduation (notch) moves the point of impact of bullet as indicated.

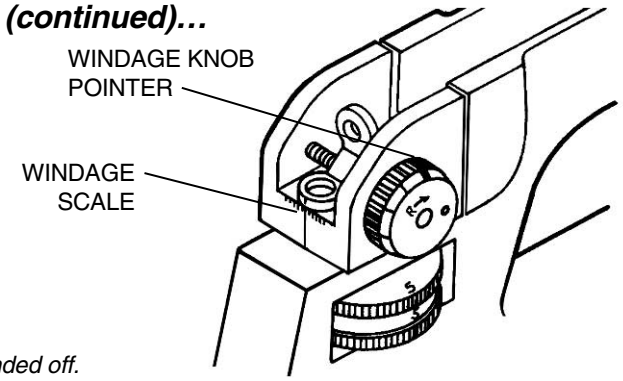


IMPACT	DISTANCE
0.9 cm (3/8 in.)	25 meters
3.5 cm (1 3/8 in.)	100 meters
7.0 cm (2 3/4 in.)	200 meters

ZEROING ADJUSTMENTS (continued)…

FOR WINDAGE KNOB (per click)*…

IMPACT	DISTANCE
0.3 cm (1/8 in.)	25 meters
1.25 cm (1/2 in.)	100 meters
2.50 cm (1 in.)	200 meters
3.8 cm (1 1/2 in.)	300 meters
5.0 cm (2 in.)	400 meters
6.3 cm (21/2 in.)	500 meters
7.6 cm (3 in.)	600 meters
8.8 cm (3 1/2 in.)	700 meters
10.0 cm (4 in.)	800 meters



**All the above values have been rounded off.*

To remember your correct zero windage, note location of Windage Scale and Windage Knob Pointer (heavy mark on outside of knob). Once you have established your correct zero windage leave your Windage Scale and Windage Knob Pointer on these settings at all times.

25 METER ZEROING PROCEDURES…

Place an appropriate 25 Meter Paper Sighting Target 25 meters downrange and follow the steps below to establish a "battlesight" zero.

1.) Do not move the front sight post on your Bushmaster XM15 E2S rifle at this time. It was set at the factory and should be very close to your zero.

2.) Center the rear sight aperture by turning the windage knob left or right. This is called **"Mechanical Zero Windage"**.

 3.) The Unmarked (smaller) Aperture should be up.

25 METER ZEROING PROCEDURES (continued)…

4.) Now rotate the elevation knob "up" one click past the 300-meter mark. From this point on, the elevation knob should not be moved. Any changes in elevation required in the following zeroing steps are made to the **front sight post only.**

5.) Carefully aim and fire at the center of the target bull's-eye.

6.) If your shot group is not in the center of the bull's-eye, use the squares on the target sheet to calculate the required "clicks" necessary to move your next shot group into the bull's-eye.

Remember - any changes in elevation are made by moving front sight post only!

7.) In order **to raise your next shot group,** rotate the front sight post clockwise. **One click of the front sight post will move the the bullet strike one vertical square on the target sheet.**

In order **to lower your next shot group,** rotate the front sight post counter-clockwise. One click of the front sight post, as above, equals one square.

Changes in windage are made with the windage knob. Three clicks will move the strike of the bullet one horizontal square on the target sheet.

In order to move the shot group to the **left, turn the windage knob counterclockwise.**

In order to move the shot group to the **right, turn the windage knob clockwise.**

8.) Carefully aim and fire another group at the center of the target bull's-eye.

9.) Repeat Steps 7 through 9, if required.

10.) If your group is on target, your sight is now "calibrated." To place your actual 300-meter zero on the rifle, you must rotate the elevation knob one click "down." (The range scale's 300-meter mark should now be aligned with the mark on the rifle's receiver.)

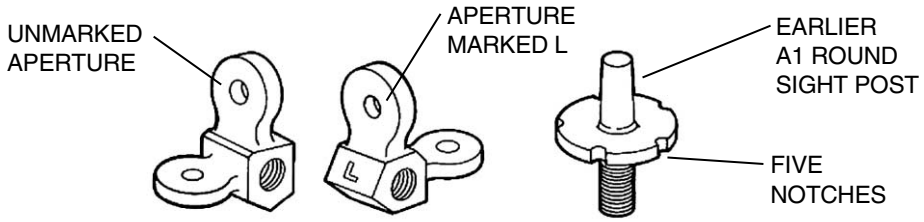
A1 TYPE RIFLE SIGHTS - DIFFERENCES & ADJUSTMENTS…

A1 Type Rifles have sights that differ a bit from the later A2 Style.

The A1 REAR SIGHT Has two apertures for differing ranges but does not offer any mechanical means of adjustment for elevation

- Use the unmarked aperture for targets from 0 - 300 meters.
- Use the aperture marked **L** for targets from 300 - 400+ meters.

The A1 FRONT SIGHT - Has five notches of elevation per revolution (instead of the four notches found on A2 square post type front sight - Bushmaster only uses the A2 type Front Sight Post in its current production models).

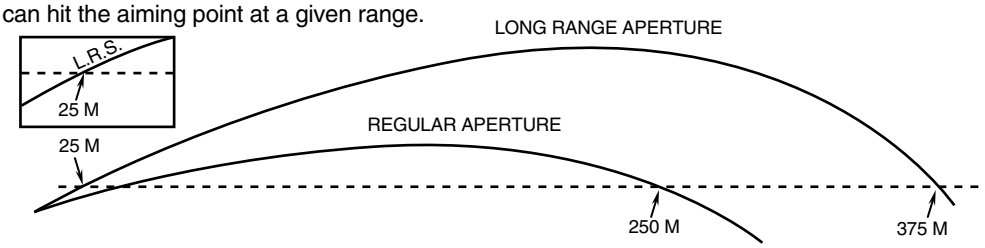


1.) Battlesight zero is that setting on the Rifle's sights which will cause the point of aim and strike of the bullet to be the same at 250 meters.

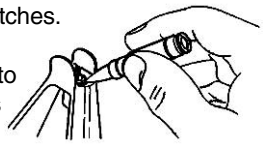
2.) When using the L-marked aperture, the path of the bullet will cross the line of sight at 25 meters. Hence, zeroing is now conducted with point of aim and point of impact being the same (see chart on next page).

A1 SIGHTS - DIFFERENCES & ADJUSTMENTS (continued)…

NOTE: To zero the rifle, adjust the front sight (elevation) and the rear sight (windage) so that you can hit the aiming point at a given range.



FRONT SIGHT - To adjust elevation, depress detent and rotate post as described previously for A2 Front Sight Post. The 5 notches of the A1 post allow for a finer adjustment than does the square A2 Post with 4 notches.
NOTE: Bushmaster uses only the newer A2 square front sight post.

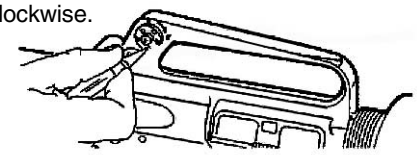


REAR SIGHT - To adjust windage, depress detent and rotate drum to direction you want. Each notch moves the point of impact of bullet as indicated in chart.

1.) To move point of impact to right, turn drum clockwise in direction of arrow and letter R.

2.) To move point of impact to left, turn drum counterclockwise.

IMPACT	DISTANCE
0.7cm (17/64 in.)	25 meters
2.8cm (1-3/32 in.)	100 meters
5.6cm (2-13/64 in.)	200 meters

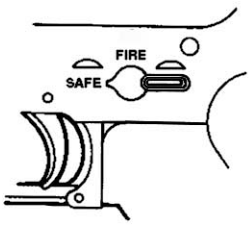


OPERATION OF YOUR RIFLE…

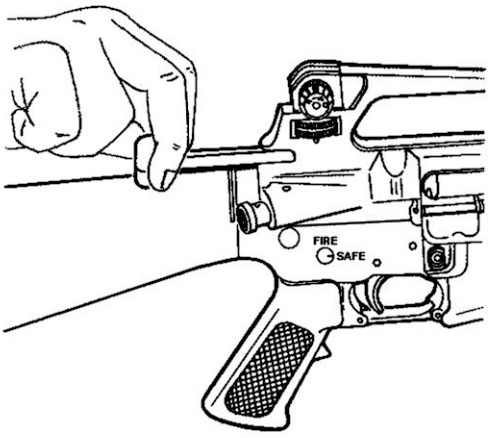
WARNING: If a noticeable difference in sound or recoil is experienced, STOP FIRING. Either condition could indicate an incomplete powder burn and/or a bullet stuck in the bore (Also see Page 45)***. Retract the bolt slowly and remove the fired cartridge case. Clear the weapon and check for unburned powder grains in the receiver or bore, and for a bullet stuck in the bore. Clean out any unburned powder before resuming firing. If a bullet is stuck in the bore, do not attempt to remove it. Take the rifle to a qualified gunsmith.***

LOADING…

CAUTION:
ALWAYS POINT THE MUZZLE IN A SAFE DIRECTION!



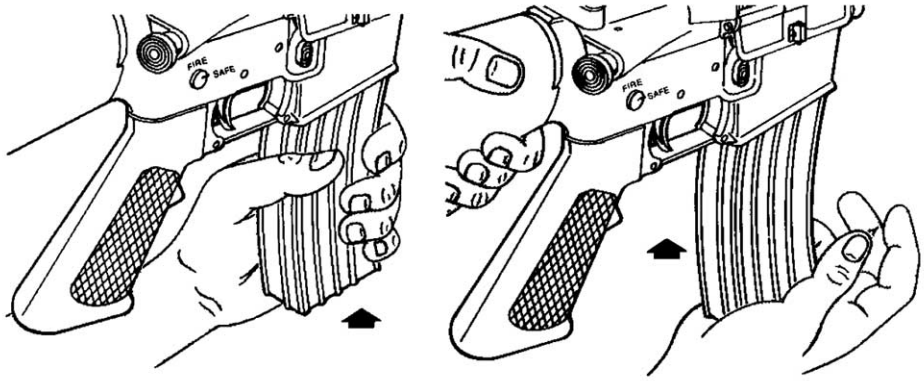
1.) With Hammer cocked, place Selector Lever on ***SAFE.***



2.) Open Bolt and check Chamber. Make sure it is clear.

OPERATION OF YOUR RIFLE…

INSERTING A MAGAZINE…



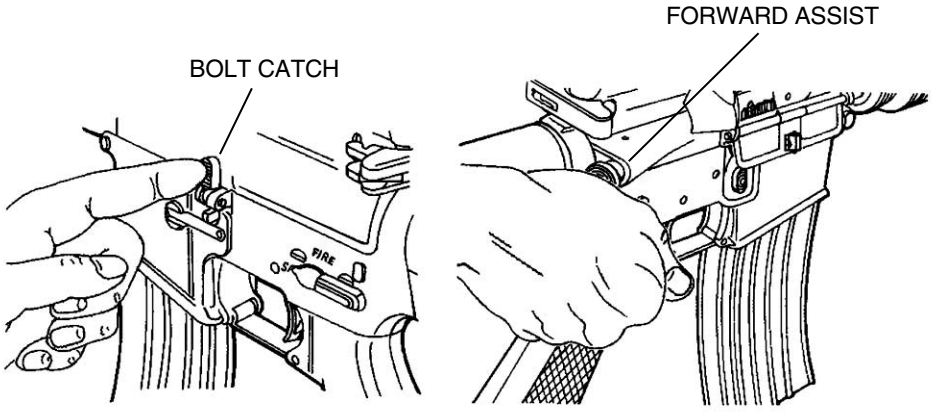
3.) Push Magazine up into Magazine Well until Magazine Catch engages and holds the Magazine.

4.) Tap upward on Magazine bottom to make sure it's seated correctly.

OPERATION OF YOUR RIFLE…

CHAMBERING A ROUND with Bolt Assembly Open…

NOTE: The Magazine may be inserted into the Rifle with Bolt Assembly open or closed.

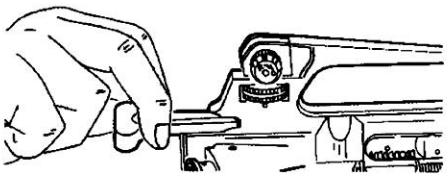


1.) Depress upper portion of Bolt Catch. Bolt should spring forward.

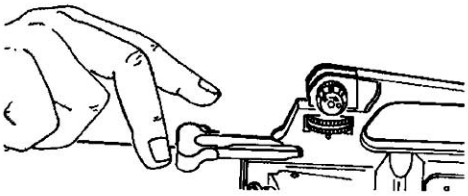
2.) TAP the Forward Assist to ensure Bolt is fully forward and locked.

OPERATION OF YOUR RIFLE…

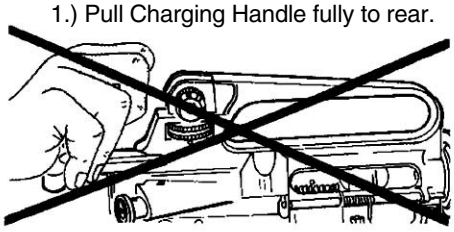
CHAMBERING A ROUND with Bolt Assembly Closed…



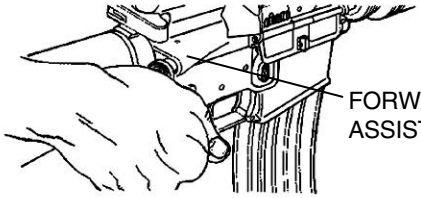
1.) Pull Charging Handle fully to rear.



2.) Release the Charging Handle.



NEVER "Ride" (or push) the Charging Handle. Let it move forward on its own.

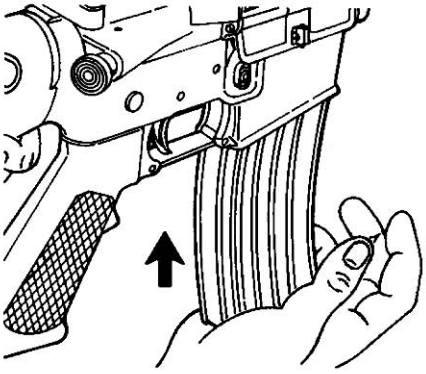


3.)TAP the Forward Assist to ensure Bolt is fully forward and locked.

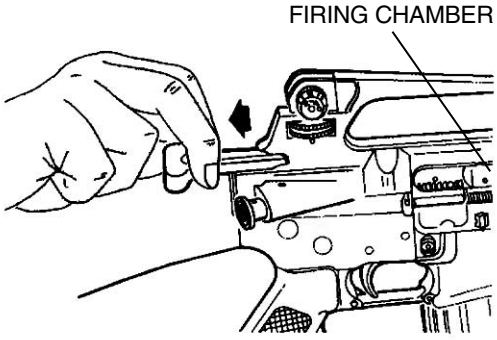
NOTE: If the Rifle is not going to be fired immediately, make sure the Selector Lever is still on SAFE, and close the Ejection Port Cover to keep out dirt.

IMMEDIATE ACTION in case of trouble…

IF YOUR RIFLE STOPS FIRING: Perform the following immediate actions…



1.) SLAP upward on Magazine to make sure it's seated properly.

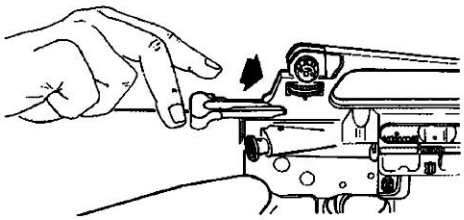


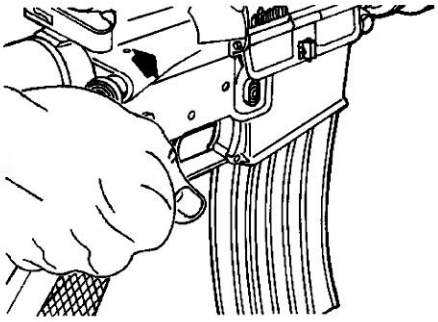
2.) PULL Charging Handle all the way back Observe ejection of case or cartridge. Check Chamber for any obstruction.

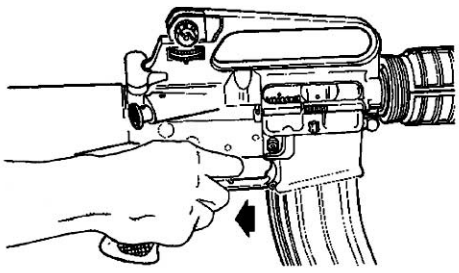
WARNING: DO NOT LOAD WITH A HOT CHAMBER. A ROUND MAY "COOK OFF" (meaning it may fire from the heat of the chamber)

IMMEDIATE ACTION in case of trouble (continued)…

3.) If cartridge or case is ejected or chamber is clear, RELEASE Charging Handle to feed a new round. Don't "ride" the Charging Handle forward.





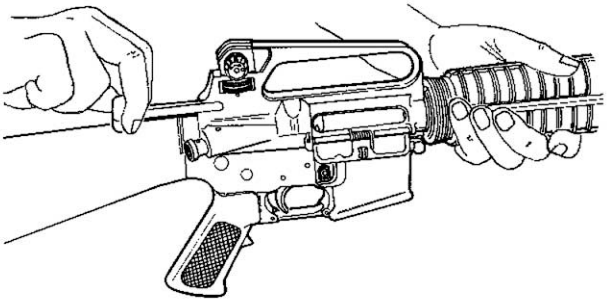


4.) TAP Forward Assist.

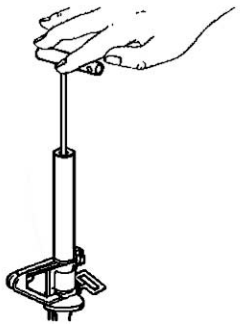
5.) Now FIRE. If the Rifle won't fire, look for trouble and apply remedial action. (See next page.)

REMEDIAL ACTION…

WARNING: If your rifle stops flring with a live round in the chamber of a hot barrel, remove the round fast. However, if you cannot remove it within 10 seconds, remove the magazine and wait 15 minutes with the rifle pointing in a safe direction (always check that the "SAFE" direction remains safe during that time). This way you won't get hurt by a possible round cooking off. REGARDLESS, KEEP YOUR FACE AWAY FROM THE EJECTION PORT WHILE CLEARING A HOT CHAMBER.



If your Rifle still fails to fire after performing Steps 1 through 5 on previous page, check again for a jammed cartridge case.



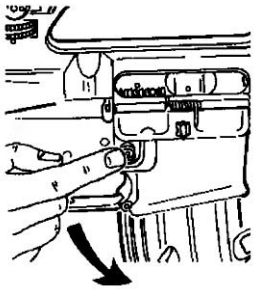
If a cartridge case is in the chamber, open the receivers, remove the bolt carrier, and try to tap out the case with a cleaning rod.

IF YOUR RIFLE STILL FAILS TO FIRE, CHECK THE TROUBLESHOOTING SECTION IN THIS MANUAL - OR TAKE THE RIFLE TO A QUALIFIED GUNSMITH.

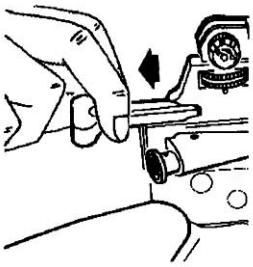
BULLET STUCK IN THE BORE…

WARNING: If an audible "POP" or reduced RECOIL is experienced during firing, immediately CEASE FIRE: Then, (1) Remove the Magazine, (2) Lock the Bolt to the rear, (3) Place the Selector Lever on the SAFE position and (4) visually inspect and/or insert a cleaning rod into the bore to ensure there is not a bullet stuck in the bore.

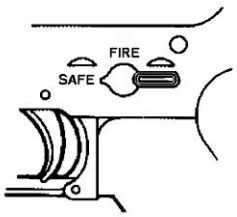
1. Remove the Magazine



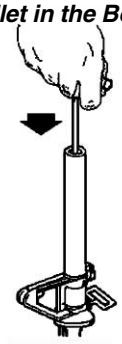
2. Lock the Bolt to the rear.



3. Place the Selector Lever on SAFE



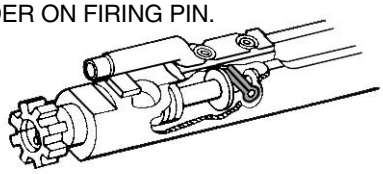
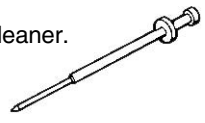
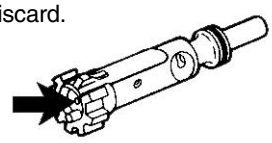
4. Check for a Bullet in the Bore



DO NOT APPLY THE "IMMEDIATE ACTIONS" PREVIOUSLY DESCRIBED ON PAGE 43.

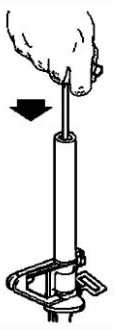
IF A BULLET IS STUCK IN THE BARREL OF THE WEAPON, DO NOT TRY TO REMOVE IT. TAKE THE RIFLE TO A QUALIFIED GUNSMITH.

TROUBLESHOOTING…

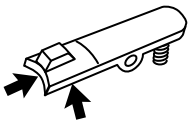
PROBLEM	CHECK FOR:	WHAT TO DO
WON'T FIRE	Selector Lever on SAFE	Put it on FIRE
	Improper assembly of Firing Pin.	Assemble correctly. RETAINING PIN GOES IN BACK OF LARGE SHOULDER ON FIRING PIN. 
	Too much oil in Firing Pin recess.	Wipe out with pipe cleaner. 
	Defective Ammunition	Remove and discard.
	Too much carbon on Firing Pin or in Firing Pin recess.	Clean. 

TROUBLESHOOTING (continued)…

PROBLEM	CHECK FOR:	WHAT TO DO
BOLT WON'T UNLOCK	Dirty or burred Bolt.	Clean or see a qualified gunsmith.
WON'T EXTRACT	Broken Extractor Spring.	See a qualified gunsmith.
	Dirty or corroded Ammo.	Remove stuck round - push out with cleaning rod.



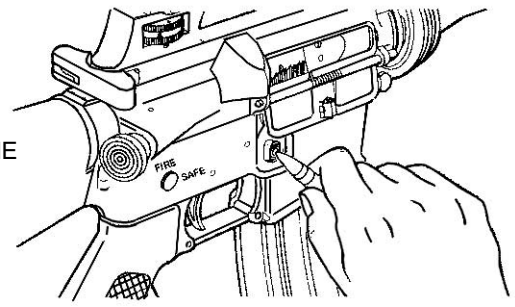
	Carbon in Chamber.	Clean Chamber.
	Fouling or carbon in Extractor recess or lip.	Clean Extractor.



TROUBLESHOOTING (continued)…

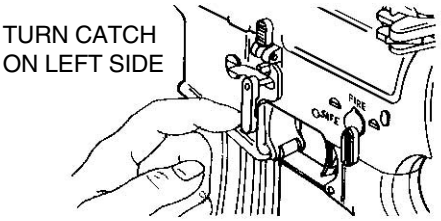
PROBLEM	CHECK FOR:	WHAT TO DO
WON'T FEED	Dirty or corroded Ammo.	Clean.
	Dirty Magazine.	Clean.
	Defective Magazine.	Replace.
	Too many rounds in Magazine.	Take out excess.
	Action of Buffer Assembly is restricted.	Take out Buffer and Spring - Clean them.
	Magazine not fully seated.	Adjust Magazine Catch:

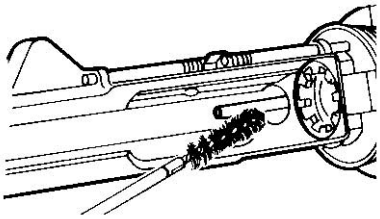
PRESS MAGAZINE CATCH BUTTON ON RIGHT SIDE



TROUBLESHOOTING (continued)…

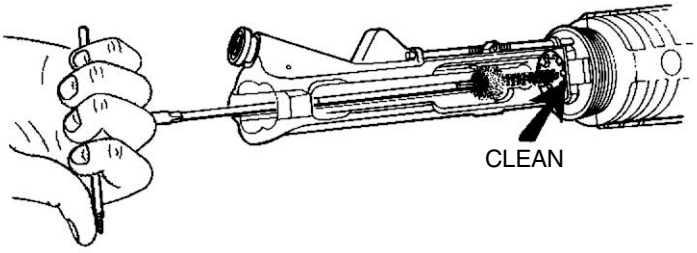
PROBLEM	CHECK FOR	What To Do
WON'T FEED (continued)		Turn Catch Clockwise to tighten and Counterclockwise to loosen
DOUBLE FEED	Defective Magazine.	Replace.
WON'T CHAMBER	Dirty or corroded Ammo.	Clean.
	Damaged Ammo.	Replace.
	Carbon in Chamber or on Gas Tube	Clean.

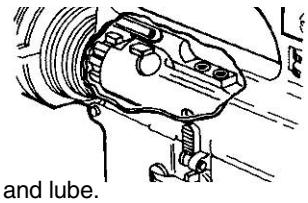




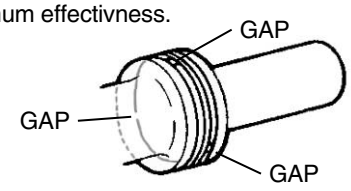
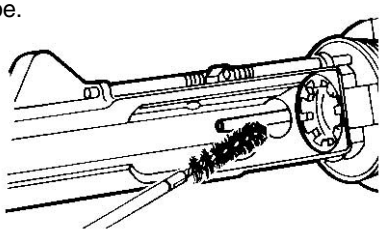
TROUBLESHOOTING (continued)…

PROBLEM	CHECK FOR:	WHAT TO DO
WON'T LOCK	Dirt, corrosion, or carbon buildup in barrel locking lugs	Clean lugs.
WON'T EXTRACT	Frozen Extractor.	Remove and clean.
	Restricted Buffer Assembly.	Remove and clean.
	Restricted movement of Bolt Carrier Group.	Remove, clean, and lube. (Before putting Bolt back in, make sure Gas Tube fits into Carrier Key and that the Carrier moves freely.)

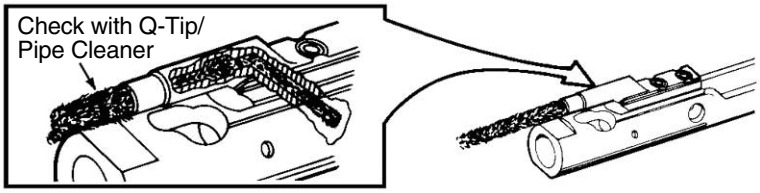




TROUBLESHOOTING (continued)…

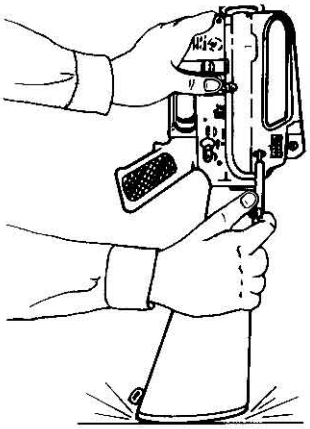
PROBLEM	CHECK FOR	What To Do
SHORT RECOIL	Correct alignment of Gaps in Bolt Gas Rings	"Gaps" in the 3 Gas Rings should be staggered 120 around the Bolt body for maximum effectivness. 
	Carbon or dirt in Carrier Key or on outside of Gas Tube.	Clean Carrier Key or around area of the Gas Tube. 

TROUBLESHOOTING (continued)…

PROBLEM	CHECK FOR:	WHAT TO DO
SHORT RECOIL (continued)	Q-Tip or Pipe Cleaner pieces stuck inside Carrier Key.	Clean out if possible or have Rifle checked by a qualified gunsmith. 
BOLT FAILS TO LOCK AFTER LAST ROUND	Dirty or corroded Bolt Latch.	Clean - or replace Bolt Catch. Check for Buffer Endcap backout or obstruction. Check for full travel of Bolt Carrier
	Faulty Magazine	Replace.
SELECTOR LEVER BINDS	Needs oil.	Lubricate with CLP.
	Dirt or sand under Trigger.	Clean.

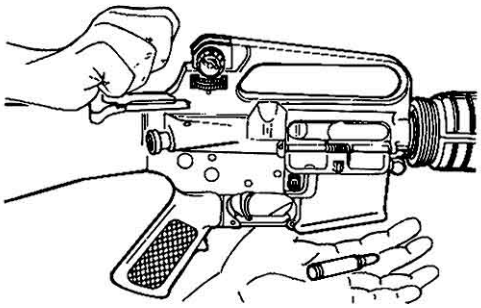
TROUBLESHOOTING (continued)…

PROBLEM	CHECK FOR:	WHAT TO DO
BOLT CARRIER "HUNG UP"	Round jammed between Bolt and Charging Handle and/or double feed	1.) Remove Magazine. 2.) Push in on the bottom of the Bolt Latch. 3.) While pulling down on Charging Handle, bang the Rifle Butt on the ground. Bolt should lock to the rear. 4.) While Bolt is held to the rear, round should fall through the Magazine well.



WARNING: KEEP CLEAR OF MUZZLE.

CAUTION: AFTER ROUND IS REMOVED, BOLT IS UNDER TENSION.

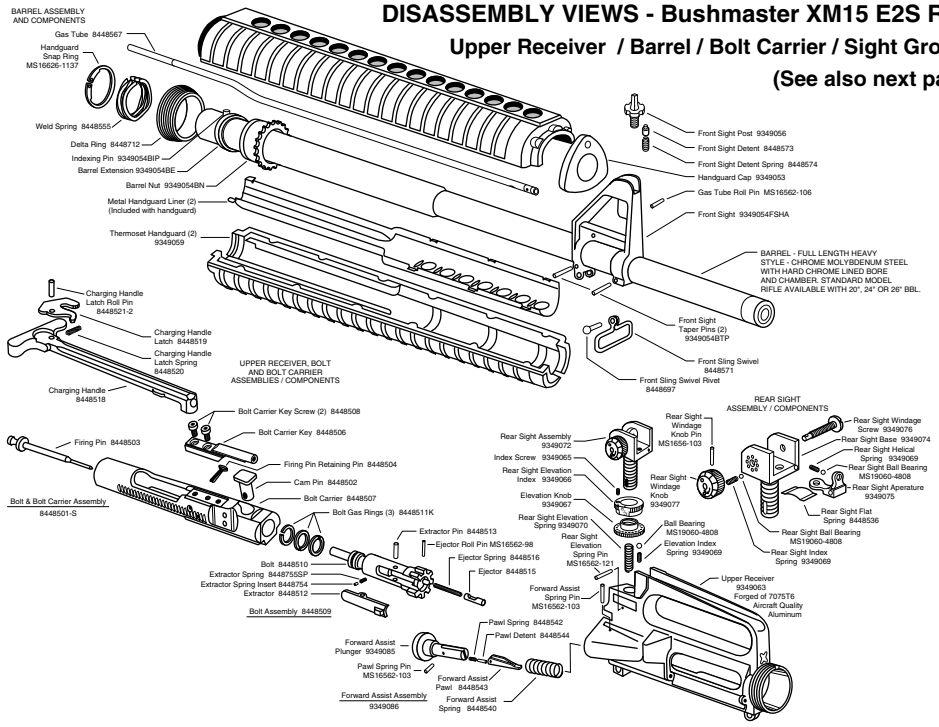


NOTE: If this procedure fails, use a section of cleaning rod to push the Bolt fully to rear through the Ejection Port.

DISASSEMBLY VIEWS - Bushmaster XM15 E2S Rifle

Upper Receiver / Barrel / Bolt Carrier / Sight Groups

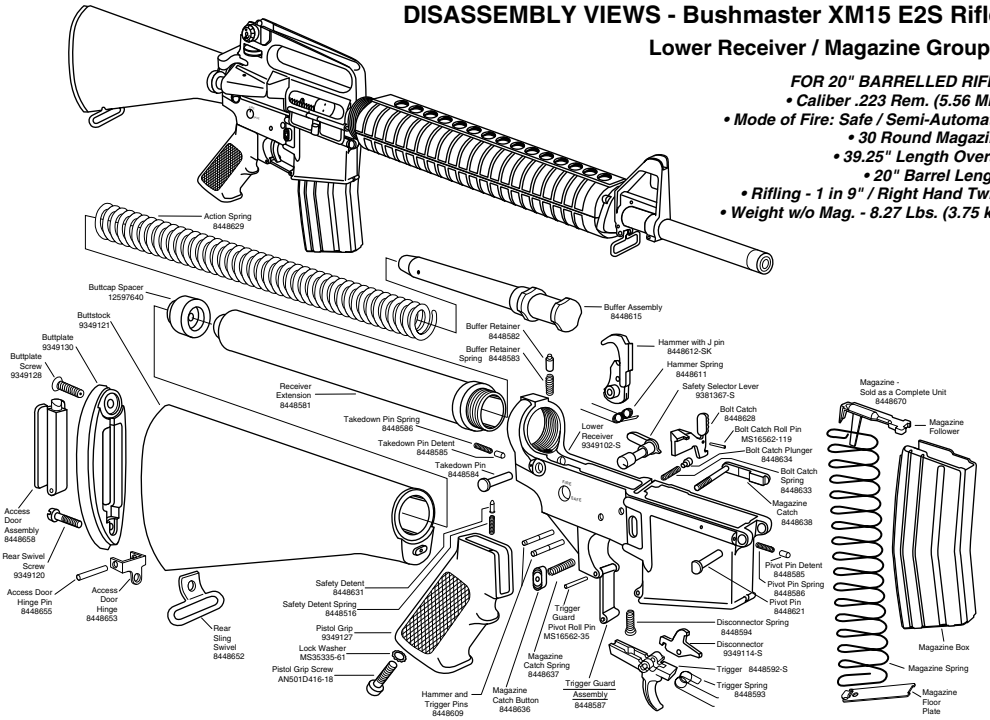
(See also next page)


BARREL ASSEMBLY AND COMPONENTS
Gas Tube 8448567
Handguard Snap Ring MS16626-1137
Weld Spring 8448555
Delta Ring 8448712
Indexing Pin 9349054BIP
Barrel Extension 9349054BE
Barrel Nut 9349054BN
Metal Handguard Liner (2) (Included with handguard)
Thermoset Handguard (2) 9349059
Front Sight Post 9349056
Front Sight Detent 8448573
Front Sight Detent Spring 8448574
Handguard Cap 9349053
Gas Tube Roll Pin MS16562-106
Front Sight 9349054FSHA
BARREL - FULL LENGTH HEAVY STYLE - CHROME MOLYBDENUM STEEL WITH HARD CHROME LINED BORE AND CHAMBER. STANDARD MODEL RIFLE AVAILABLE WITH 20", 24" OR 26" BBL.
Front Sight Taper Pins (2) 9349054BTP
Front Sling Swivel 8448571
Front Sling Swivel Rivet 8448697
Charging Handle Latch Roll Pin 8448521-2
Charging Handle Latch 8448519
Charging Handle Latch Spring 8448520
Charging Handle 8448518
UPPER RECEIVER, BOLT AND BOLT CARRIER ASSEMBLIES / COMPONENTS
Bolt Carrier Key Screw (2) 8448508
Bolt Carrier Key 8448506
Firing Pin 8448503
Firing Pin Retaining Pin 8448504
Cam Pin 8448502
Bolt Carrier 8448507
Bolt & Bolt Carrier Assembly 8448501-S
Bolt Gas Rings (3) 8448511K
Extractor Pin 8448513
Ejector Roll Pin MS16562-98
Ejector Spring 8448516
Ejector 8448515
Bolt 8448510
Extractor Spring 8448755SP
Extractor Spring Insert 8448754
Extractor 8448512
Bolt Assembly 8448509
REAR SIGHT ASSEMBLY / COMPONENTS
Rear Sight Assembly 9349072
Index Screw 9349065
Rear Sight Elevation Index 9349066
Elevation Knob 9349067
Rear Sight Elevation Spring 9349070
Rear Sight Elevation Spring Pin MS16562-121
Rear Sight Windage Knob Pin MS1656-103
Rear Sight Windage Knob 9349077
Ball Bearing MS19060-4808
Elevation Index Spring 9349069
Rear Sight Index Spring 9349069
Rear Sight Windage Screw 9349076
Rear Sight Base 9349074
Rear Sight Helical Spring 9349069
Rear Sight Ball Bearing MS19060-4808
Rear Sight Aperature 9349075
Rear Sight Flat Spring 8448536
Rear Sight Ball Bearing MS19060-4808
Forward Assist Spring Pin MS16562-103
Upper Receiver 9349063 Forged of 7075T6 Aircraft Quality Aluminum
Pawl Spring 8448542
Pawl Detent 8448544
Forward Assist Plunger 9349085
Pawl Spring Pin MS16562-103
Forward Assist Pawl 8448543
Forward Assist Spring 8448540
Forward Assist Assembly 9349086

DISASSEMBLY VIEWS - Bushmaster XM15 E2S Rifle

Lower Receiver / Magazine Groups

FOR 20" BARRELLED RIFLE
• Caliber .223 Rem. (5.56 Mm)
• Mode of Fire: Safe / Semi-Automatic
• 30 Round Magazine
• 39.25" Length Overall
• 20" Barrel Length
• Rifling - 1 in 9" / Right Hand Twist
• Weight w/o Mag. - 8.27 Lbs. (3.75 kg)



PLEASE PRACTICE SAFE FIREARMS HANDLING

If your Bushmaster Operation Manual is lost or destroyed, you can obtain a replacement by writing to ***Bushmaster Firearms, Inc. 999 Roosevelt Trail, Windham, Maine 04062 USA or by calling 1-800-883-6229***. When requesting a manual, include the serial number of your rifle.

This Operation Manual should always accompany this firearm. When you lend, give or sell this firearm, be sure this Manual goes with it.

Model: _____

Serial Number: _____

Purchased from: _____

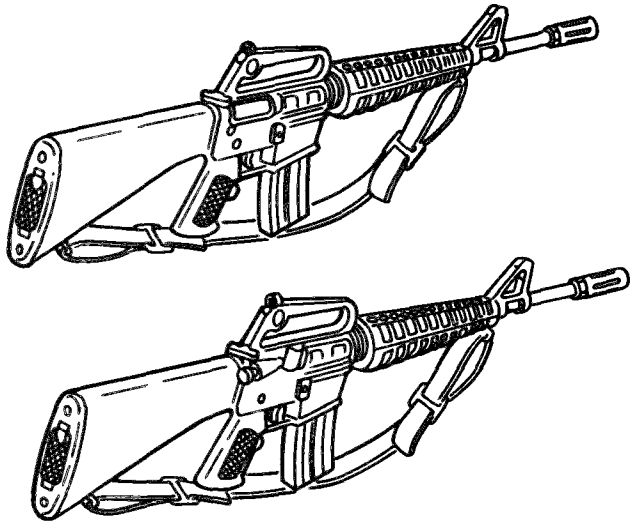
Date Purchased: _____

ARMY TM 9-1005-249-23&P
AIR FORCE TO 11W3-5-5-24
COAST GUARD COMDTINST M8370.9

Supersedes Copy Dated November 1983

TECHNICAL MANUAL

UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
RIFLE, 5.56MM, M16 (1005-00-856-6885) (EIC:4F7)
RIFLE, 5.56 MM, M16A1 (1005-00-073-9421) (EIC:4FC)



INTRODUCTION	1-1
UNIT MAINTENANCE INSTRUCTIONS	2-1
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS	3-1
MAINTENANCE AUXILIARY EQUIPMENT	4-1
REFERENCES	A-1
MAINTENANCE ALLOCATION CHART	B-1
REPAIR PARTS AND SPECIAL TOOLS LIST	C-1
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST	D-1
ILLUSTRATED LIST OF MANUFACTURED ITEMS	E-1
TORQUE LIMITS	F-1
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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND) AIR FORCE, COMMANDANT, COAST GUARD

JUNE 1991

METRIC CHART

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

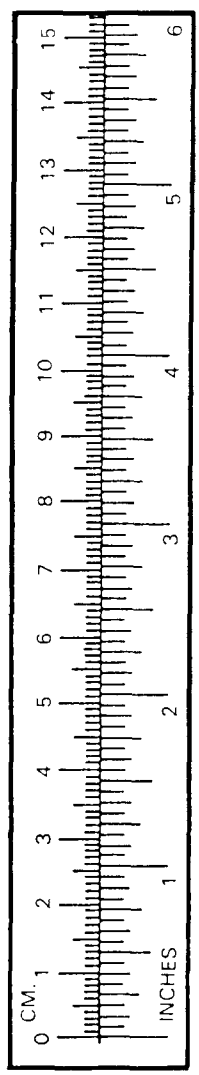
TEMPERATURE

5/9 (°F -32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° +32 = F°

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



WARNING

RADIATION HAZARD

TRITIUM (H3)

A. **RULES AND REGULATIONS:** Copies of the following rules and regulations are maintained at HQ, AMCCOM, Rock Island, IL 61299-6000. Copies may be requested, or information pertinent to these rules and regulations obtained, by contacting the AMCCOM Radiological Protection Officer (RPO), AUTOVON 793-2964/2965/2966 Commercial (309) 782-2964/2965/2966.

(1) 10CFR Part 19 - Notices, Instructions, and Reports to Workers; Inspections.

(2) 10CFR Part 20 - Standards for Protection Against Radiation.

(3) NRC license, license conditions, and license application.

B. **SAFETY PRECAUTIONS.** The radioactive material used in this rifle is tritium gas (H3) sealed in a glass tube. It poses no significant hazard to the repairman when intact. The source illuminates the front sight for night operations. Tampering with or removal of the source in the field is prohibited by Federal law. In the event there is no illumination, notify the local Radiological Protection Officer. Do not attempt to repair or replace the sight in the field! If skin contact is made with any area contaminated with tritium, immediately wash with nonabrasive soap and water.

C. **IDENTIFICATION:** The radioactive self-luminous source is identified by means of a radioactive warning label (as above). This label should not be defaced or removed, and should be replaced immediately when necessary. Refer to the local RPO or the AMCCOM RPO for instructions on handling, storage, or disposal.

D. **STORAGE AND SHIPPING:** All radioactively illuminated instruments or modules which are defective will be evacuated to a depot maintenance activity. These items must be placed in a plastic bag and packaged in the shipping container from which the replacement was taken, before evacuation to a higher echelon is made. Spare equipment must be stored in the shipping container, as received, until installed on the weapon. Storage of these items is recommended to be in an outdoor shed type storage or unoccupied building.

WARNING

Read this manual carefully before performing required maintenance. This manual will be referred to for Inspection/ Maintenance and Repair procedures.

Before starting an inspection, be sure to clear the rifle. Do not actuate the trigger until the rifle has been cleared. Inspect the chamber to ensure that it is empty and no ammunition is in position to be chambered. Do not keep live ammunition near work area.

To avoid injury to your eye, use care when removing and installing spring-loaded parts.

All Active Army M161/M16A1 rifles must be inspected and gaged at least once annually for safety. All Army Reserve and Army National Guard M16/M16A1 rifles must be inspected and gaged at least once every two years, after the initial inspection/gaging procedures have been accomplished. This two year interval may be maintained unless preventive maintenance checks and services (PMCS), or other physical evidence indicates that an individual unit's M16/ M16A1 rifles require inspection at a more frequent interval. If it is determined that a yearly inspection is necessary for an individual unit, only that unit will be affected. This will not affect other units in regard to the interval of inspection.

Air Force users refer to inspection requirements in AFR 50-36, Volume 1.

WARNING (cont)

Below Direct Support Maintenance, DO NOT interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.

Bolt cam pin must be installed or weapon will blow up while firing the first round. If the bolt cam pin is not installed, injury to, or death of, personnel may result.

Dry cleaning solvent is flammable and toxic and should be used in a well-ventilated area. The use of rubber gloves is necessary to protect the skin when washing rifle parts.

When using solid film lubricant or dichloromethane, be sure the area is well ventilated

When using P-C-111, avoid skin contact. If it comes in contact with the skin, wash off thoroughly with running water. Using a good lanolin base cream after exposure to compound is helpful. Gloves and protective equipment are recommended.

For further information on safety, care, and handling of ammunition: Army and Air Force users refer to M16/M16A1 Operator's Manual TM 9-1005-249-10/TO 11A13-10-7; Coast Guard users refer to OP4 or OP5.

For additional first aid data, see FM 21-11

TECHNICAL MANUAL
ARMY NO. 9-1005-249-23&P
AIR FORCE TO 11W3-5-5-24
COAST GUARD COMDTINST M8370.9

*ARMY TM 9-1005-249-23&P
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COAST GUARD COMDTINST M8370.9

HEADQUARTERS, DEPARTMENTS OF THE ARMY
AND AIR FORCE
COMMANDANT, COAST GUARD
Washington, DC 19 June 1991

Unit and Direct Support Maintenance Manual
(Including Repair Parts and Special Tools List)
RIFLE, 5.56MM, M16
(1005-00-856-6885)
RIFLE, 5.56MM, M16AI
(1005-00-073-9421)

Current as of 7 January 1991

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know.

Army users mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), located in the back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000.

Air Force users submit AFTO Form 22, Technical Order System Publications Improvement Report and Reply to: WR-ALC/MMDET, Robins AFB, GA 31098-5609.

Coast Guard users submit Publications Correction/Change Report form CG 4394 to: Commandant, U.S. Coast Guard (G-ODO-2), Washington, DC 20593-0001.

A reply will be furnished to you.

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*This manual supersedes TM 9-1005-249-24&P, dated 25 November 1983, including all changes and TO 11W3-5-5-24 dated 10 February 1972.

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HOW TO USE THIS MANUAL

Read this manual carefully before performing required maintenance. This manual will be referred to for Inspection/Maintenance and Repair procedures.

GENERAL

There arc several things you need to know to use this manual efficiently.

1. All references in the manual are to pages only. Referencc to maintenance procedures is to the page whcrc the respective initial setup appears.

2. Illustrations for the maintenance procedures show only those parts affected by the opeation being performed.

3. Whenever the male gender is mentioned in the manual (i.e., crewman, repairman), it also pertains to females.

4. When the term “evacuate to support maintenance” is used, the entire rifle must be evacuated.

INDEXES

This manual is organized to help you find the information you need quickly. There are several useful indexes.

1. Front Cove-r Index. Lists the most important areas of the manual. It is keyed to areas with bleed-to-edge indicators.

2. Table of Contents. Lists in order all chapters, sections, and appendixes. Gives page references.

3. Nomenclature Cross-References List.

4. Chapter Overviews. Summarise material covered in the chapter. Are located at the beginning of each chapter.

5. Symptom Index. Located just before the troubleshooting table in each maintenance chapter. Lists, in alphabetical order, parts of&e rifle with possible malfunctions. References pages of the troubleshooting table.

6. Alphabetical Index. Located at the end of the manual. An extensive subject index for everything in the manual Gives page references.

MAINTENANCE PROCEDURES

There are two maintenance chapters:

Army personnel use chapter two for unit maintenance procedures and chapter three for direct support maintenance procedures.

Air Force personnel: Only Air Force Specialty Code 753XX Combat Arms Training and Maintenance (CATM) specialists, technicians, and gunsmiths are authorized to perform maintenance procedures contained in this manual.

Each maintenance task has an initial setup containing a list of the following things you will need in order to do your maintenance task:

1. Tools and Special Tools. For standard and special tools, see appendixes B and C. Army uses the Tool Set, Gage Set and/or Shop Set listed in the initial setup.

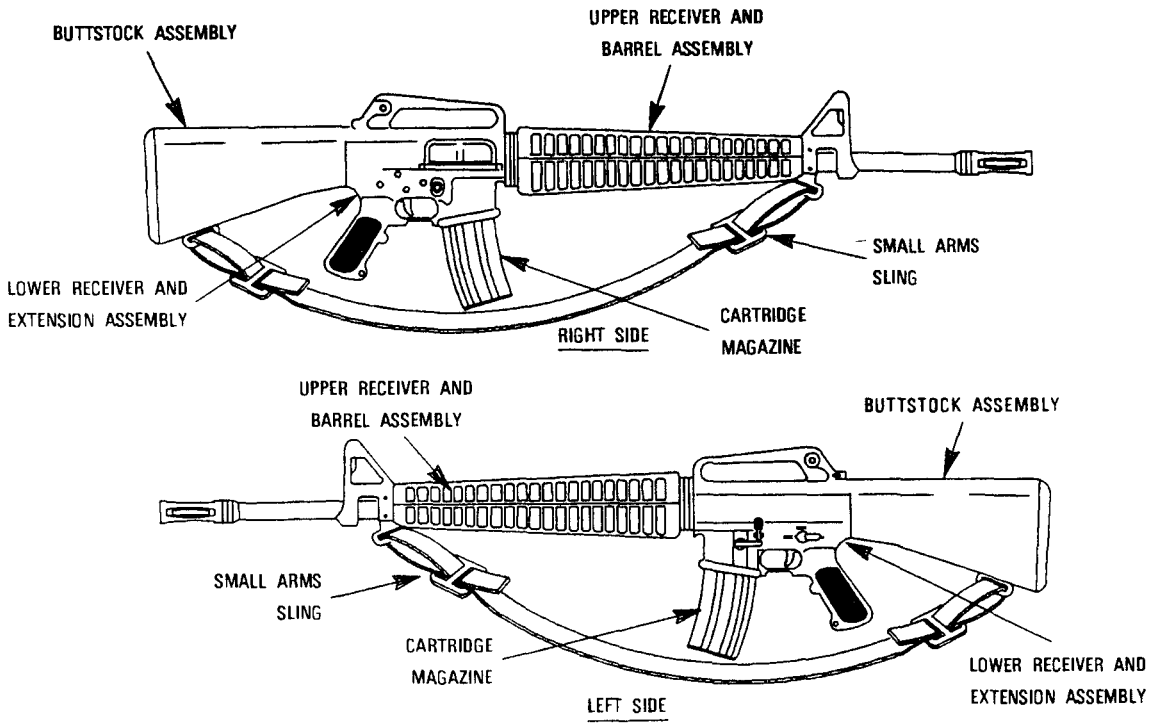
2. Materials/Parts. Lists expendable materials and 100 percent replaceable parts. Each material or part is followed by a part number or appendix reference.

3. References. Lists other publications containing necessary information,

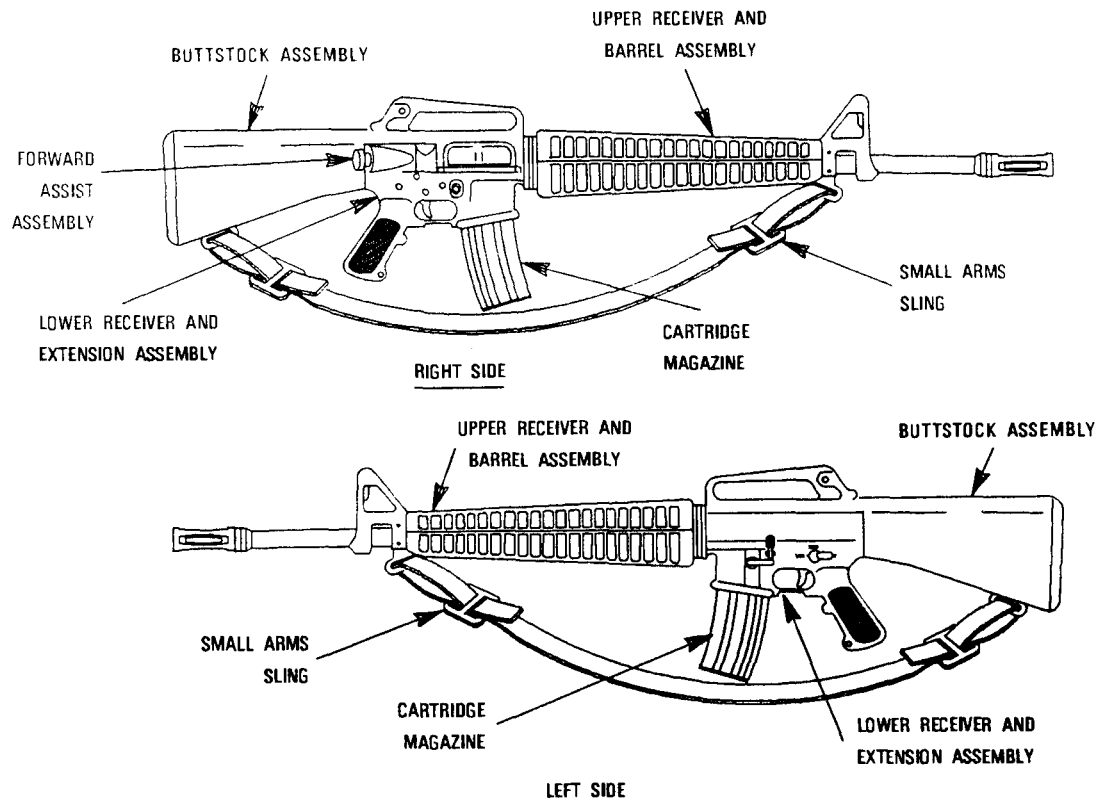
4. Equipment Condition. Lists conditions to be met before Starting the procedure. The reference on the left of the condition is a page reference to instructions for setting up the condition.

5. General Safety Instructions. Lists safety instructions to follow before performing maintenance procedures.

EXTERNAL VIEW OF 5.56MM RIFLE M16



EXTERNAL VIEW OF 5.56MM RIFLE M16A1



CHAPTER 1

INTRODUCTION

CHAPTER OVERVIEW

This chapter contains general information equipment description and data and principles of operation for your weapon.

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual: Unit and Direct Support Maintenance.

b. Model Number and Equipment Name: 5.56mm Rifle M 16 and M16A1.

c. Purpose of Equipment. Provides personnel an offensive/defensive capability to engage targets for field use.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System.

Air Force users refer to TO 11 W 1-10 for applicable forms and records.

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE. See TM 750-244-7.

1-4. PREPARATION FOR STORAGE OR SHIPMENT. Refer to chapter 4, paragraph 4-7. Air Force users refer to Special Packaging Instructions (SPI) 00-856-6885.

1-5. OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS.

NOMENCLATURE CROSS-REFERENCE LIST

Common Name	Official Nomenclature
Action Spring	Helical Compression Spring (8448629)
Bolt Catch Spring	Helical Compression Spring (8448633)
Carrier	Key and Bolt Carrier Assembly (8448505)
Disconnector Spring	Helical Compression Spring (8448594)
Ejector Spring	Helical Spring (8448516)
Extractor Spring Assembly	Spring Assembly (8448755)
Hammer Spring	Helical Torsion Spring (8448611)
Magazine Catch Spring	Helical Compression Spring (8448637)
Pistol Grip	Rifle Grip (9349127)
Pivot Pin Detent	Takedown Detent (8448585)
Trigger Spring	Helical Torsion Spring (8448593)
Weapon	5.56mm Rifle M 16 (8448600) or M 16A1 (8448500)

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR). If your rifle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on SF 368 (Product Quality Deficiency Report). Mail it to us at Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD-I, Rock Island, IL 61299-6000. We'll send you a reply.

Air Force users submit Materiel Deficiency Report (MDR) to: DIR MAT MGT ROBINS AFB GA//MMIBTC// and Product Quality Deficiency Report to: DIR MAT MGT ROBINS AFB GA//MMQA// IAW Technical Order 00-35D-54.

Coast Guard users submit PQDRs (SF 368) in accordance with COMDTINST M4855.1 to: Commandant, U.S. Coast Guard (G-ODO-2), Washington, DC 20593-0001.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. Characteristics.

(1) Lightweight
(2) Air-cooled
(3) Gas-operated
(4) Magazine-fed
(5) Semi or automatic fire

b. Capabilities. Provides personnel an offensive/defensive capability to engage targets while in the field role.

c. Features.

(1) Receivers are made of light-weight aluminum alloys; however, the safety, durability, and function of the rifles are in no way reduced. The portability and logistical values are greatly increased, particularly when air transport is used.

(2) The bolt locking action is one of the mechanical features of the weapon. The bolt and barrel extension contains locking lugs which engage and lock the bolt firmly in the barrel extension. The initial force of the explosion of the cartridge propellant is absorbed by the barrel, barrel extension, and bolt.

(3) The trigger guard is easily adaptable to winter operations. A spring-loaded retaining pin is depressed to allow ready access to the trigger when wearing arctic mittens.

(4) The ejection port cover prevents dirt or sand from getting into the ejection port, The cover must be closed during periods when firing is not anticipated. It opens automatically by the forward or rearward movement of the bolt carrier.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

(A) **CHARGING HANDLE ASSEMBLY.** Provides a means of charging the weapon.

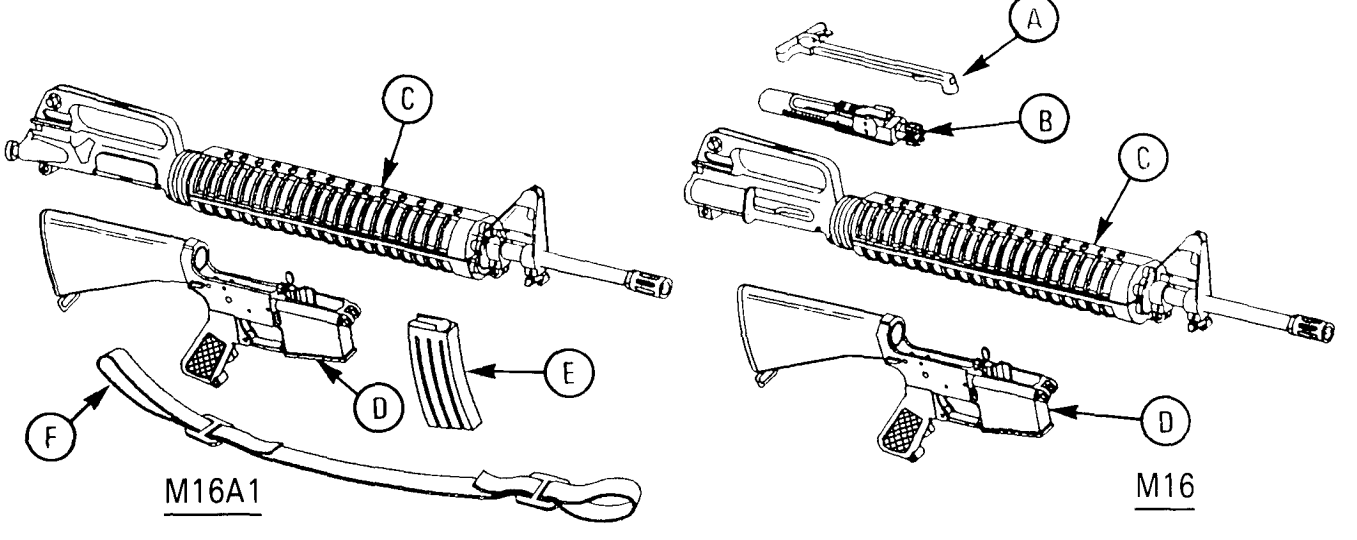
(B) **BOLT CARRIER ASSEMBLY.** Carries bolt to chamber and fires the weapon. Contains the firing pin, extractor, bolt, ejector, and cam pin.

(C) **UPPER RECEIVER AND BARREL ASSEMBLY.** Rifle barrel assembly is air-cooled, contains flash suppressor and front sight assembly, and holds the two hand guards and the sling swivel. Upper receiver contains rear sight, ejection port and cover, and a housing for the bolt carrier and bolt assembly. A forward assist assembly is used on the M16A1 weapon.

(D) **LOWER RECEIVER AND EXTENSION ASSEMBLY.** Lower receiver contains the trigger assembly, sear hammer assembly, selector lever, rifle grip, bolt catch, and buttstock assembly. The buttstock assembly houses the action spring, buffer assembly, and extension assembly.

(E) **CARTRIDGE MAGAZINE.** 30 round cartridge capacity.

(F) **SMALL ARMS SLING.** The small arms sling is adjustable and provides a means to carry the weapon.



1-9. DIFFERENCES BETWEEN MODELS. The 5.56mm Rifle M16 does not contain the forward assist assembly contained on 5.56mm Rifle M16A1.

1-10. EQUIPMENT DATA.

a. Rifles and M16 and M16A1.

Weight:

Rifle M16, without magazine and Sling	6.35lb
Rifle M16A1, without magazine and sling	6.55 lb
Sling M1	0.4lb
Empty magazine	0.25lb
Loaded magazine	1.01 lb
Rifle M16, w/sling and loaded magazine	7.76 lb
Rifle M16A1 w/sling and loaded magazine	7.96 lb
Bayonet-Knife M7	0.6lb
Scabbard M10	0.3lb

Length:

Rifle w/flash suppressor	39.625 in.
Rifle w/bayonet-knife	44.875 in.
Barrel	20in.
Barrel with flash suppressor	21 in.

Mechanical features:

Rifling - RH twist, 6 grooves, 1 turn in 12 inches

Method of operation	gas
Typeof breech mechanism	rotatingbolt
Method of feeding	magazine
Cooling	air
Trigger pull	5.5 to 8.5 lb

Ammunition:

Caliber	5.56 mm
Type	ball, blank, dummy and tracer

Firing characteristics:

Muzzle velocity (approximate)	3,250 fps
Muzzle energy	1,300 ft-lb
Chamber pressure	52,000 psi
Cyclic rate of fire (approximate)	800 rds/m

Maximum rate of fire:

Semiautomatic	45/65 rds/m
Automatic	150/200 rds/m
Sustained rate of fire	12/15 rds/m
Maximum range	2,653 meters
Maximum effective range	460 meters

b. Rifle Bipod M3.

Weight:

Bipod	0.6lb
Bipod case	0.2lb

Section III. PRINCIPLES OF OPERATION

1-11. GENERAL. The 5.56mm M16/M16A1 rifle:

a. Is gas-operated. It fires in either the automatic or semiautomatic mode.

b. Has positive locking of the bolt. Firing pin is part of the bolt and carrier assembly and cannot strike the primer until the bolt is fully locked.

1-12. PRINCIPLES OF OPERATION.

(A) **BOLT AND CARRIER ASSEMBLY.** Provides stripping, cambering, locking, firing, extraction, and ejection of cartridges using the drive springs and projectile propelling gases for power.

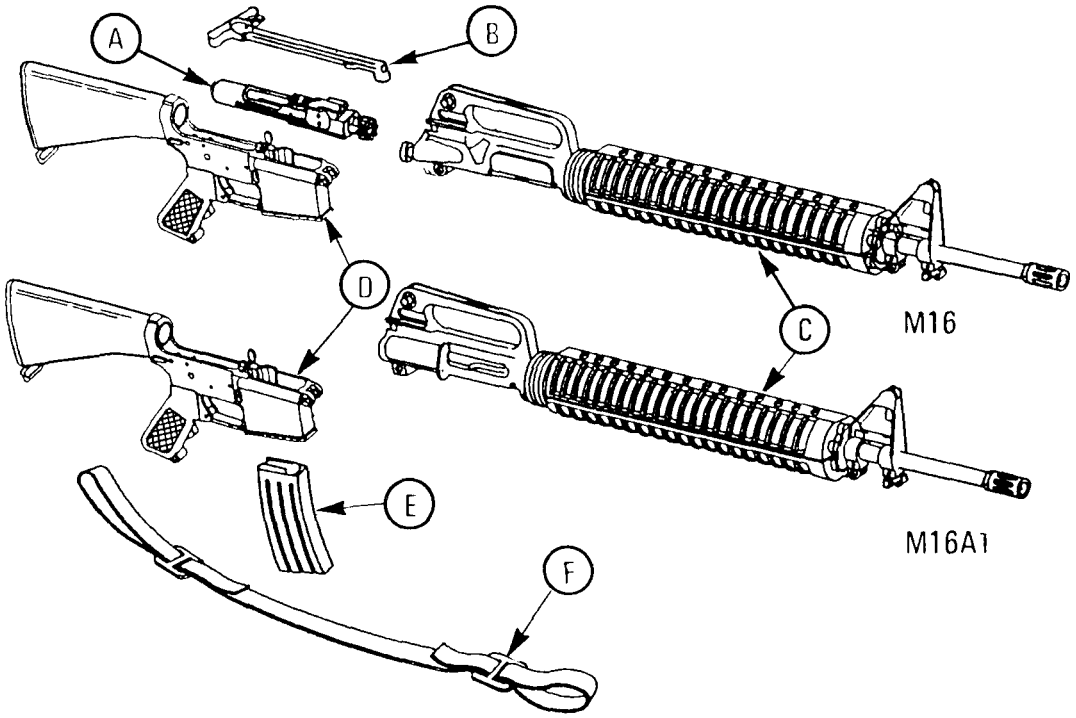
(B) **CHARGING HANDLE ASSEMBLY.** Provides initial charging of the weapon. The charging handle latch locks the handle in the forward position during sustained fire to prevent injury to the operator.

(C) **UPPER RECEIVER AND BARREL ASSEMBLY.** Provides support for the bolt carrier assembly. The barrel chambers the cartridge for firing and directs the projectile.

(D) **LOWER RECEIVER AND EXTENSION ASSEMBLY.** Provides firing control for the weapon and provides storage for basic cleaning materials.

(E) **CARTRIDGE MAGAZINE.** Holds cartridges ready for feeding and provides a guide for positioning cartridges for stripping. Provides quick reload capabilities for sustained firing.

(F) **SMALL ARMS SLING.** Provides the means for carrying the weapon.



1-13. CORROSION PREVENTION AND CONTROL (CPC). CPC of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking, of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of key words such as “corrosion”, “rust”, “deterioration” or “cracking” will assure that the information is identified as a CPC problem.

The form should be submitted to:

Commander
U.S. Army Armament, Munitions and Chemical Command
ATTN: AMSCM-QAD/Customer Feedback Center
Flock Island, Illinois 61299-6000

Air force users submit Material Deficiency Report (MDR) to:

DIR MAT MGT
ATTN: MMIBTC
Robins AFB, GA

and Product Quality Deficiency Report to:

DIR MAT MGT
ATTN: MMQA
Robins AFB, GA

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

CHAPTER OVERVIEW

This chapter contains information and instructions to help keep the weapon **in good repair. The chapter contains:**

a. Repair Parts, Special Tools, TMDE, and Support Equipment
b. Service Upon Receipt
c. Preventive Maintenance Checks and Services (PMCS)
d. Troubleshooting
e. Decontamination of Rifles and Arms Rooms
f. Maintenance Procedures

Section 1. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT. For authorized common tools **and equipment refer to the Modified Table of** Organization and Equipment (MTOE) applicable to your unit. Air Force **and Coast Guard users must maintain the** following common tools:

Three-ounce soft-brass hammer
Vise
Flat tip screwdriver
Punch
Tweezers/round nose pliers
Hammer
Needle nose pliers

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. Special tools. required for unit support are listed in appendix C. Fabricated tools are listed and illustrated in appendix E.

2-3. REPAIR PARTS. Repair parts are listed and illustrated in appendix C of this manual.

Section II. SERVICE UPON RECEIPT

2-4, GENERAL.

a. Inspect the weapon for damage incurred during shipment. If the equipment has been damaged, report the damage on SF Form 364, Report of Discrepancy (ROD).

b. Check the weapon against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions in DA PAM 738-750.

Army users submit an SF 368 (Product Quality Deficiency Report) to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD-I, Rock Island, IL 61299-6000.

Air Force users submit Materiel Deficiency Report (MDR) to: DIR MAT MGT ROBINS AFB GA//MMlBTC// and Quality Deficiency Report to: DIR MAT MGT ROBINS AFB GA//MMQA// IAW Technical Order 00-35D-54.

Coast Guard users submit PQDRs (SF 368) in accordance with COMDTINST M4855.1 to: Commandant, U.S. Coast Guard (G-000-2), Washington, DC 20593-0001.

c. Check to see whether the equipment has been modified.

d. Check to see if all MWOs have been applied.

2-5. SERVICE UPON RECEIPT OF MATERIEL. Refer to the following table.

WARNING

Before starting an inspection, be sure to clear the weapon. Do not actuate the trigger before clearing the weapon. Inspect the chamber to make sure it is empty and free of obstructions. Check to see there are no obstructions in the barrel, and no ammunition is in position to be chambered.

SERVICE UPON RECEIPT - M16/M16A1 RIFLE

LOCATION	ITEM	ACTION	REMARKS
1. Container	M16/M16A1 Rifle	a. Remove rifle from containers.	
		b. Inspect the equipment for damage incurred during shipment.	If the equipment has been damaged, report the damage on SF Form 364, Report of Discrepancy (ROD),
		c. Check the equipment against the packing list to see if the shipment is complete.	Report all discrepancies in accordance with the instructions of DA PAM 738-750.
	b. Basic issue items	Check for missing items.	TM 9-1005-249-10 (Operators Manual)
2. Rifle	a. Barrel assembly	If volatile corrosion inhibitor (VCI) is in barrel, remove and discard.	
	b. All parts	a. Field-strip rifle and inspect for missing, damaged, and rusted or corroded parts.	Refer to Operator's Manual
		b. Clean and lubricate.	Refer to Operator's Manual
		c. Reassemble.	Refer to Operator's Manual
		d. Function check	Refer to paragraph 2-22b
		e. Check to see whether the equipment has been modified.	DA PAM 25-30

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-6. GENERAL This section contains the procedures and instructions necessary to perform unit preventive maintenance checks and services. These services are to be performed by unit maintenance personnel with the assistance of the operator where practical.

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

WARNING

Before starting an inspection, be sure to clear the weapon. Do not keep live ammunition near the work area.

a. General. The PMCS procedures are contained in the table following. They are arranged in logical sequence requiring a minimum amount of time and motion on the part of the persons performing them and are arranged so that there will be a minimum interference between persons performing checks simultaneously on the same end item.

b. Item No. Column. Checks and services are numbered in disassembly sequence. This column shall be used as a source of item numbers for the "TM Number" column on DA form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

c. Interval Column. This column gives the designated interval when each check is to be performed.

d. Item To Be Checked Or Serviced Column. This column lists the items to be checked or serviced.

e. Procedure Column. This column contains a brief description of the procedure by which the check is to be performed. It contains all the information required to accomplish the checks and services.

f. Not Fully Mission Capable If: Column. This column contains a brief statement of the condition (e.g., malfunction, shortcoming (SH), deficiency (D)) that would cause the covered equipment to be less than fully ready to perform its assigned mission.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE

Item No.	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:

WARNING

Before starting an inspection, be sure to clear the rifle. Do not actuate the trigger until the rifle has been cleared. Inspect the chamber to ensure that it is empty and no ammunition is in position to be chambered. Do not keep live ammunition near work area.

NOTE

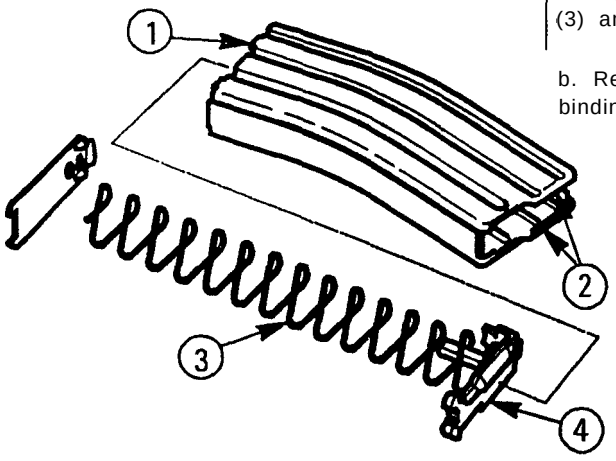
During periods of inactivity, perform preventive maintenance quarterly unless inspection reveals more frequent servicing is necessary.

An inactive weapon is a weapon which has been stored in an arms room for a period of 90 days without use. The weapon may or may not have been assigned to an individual.

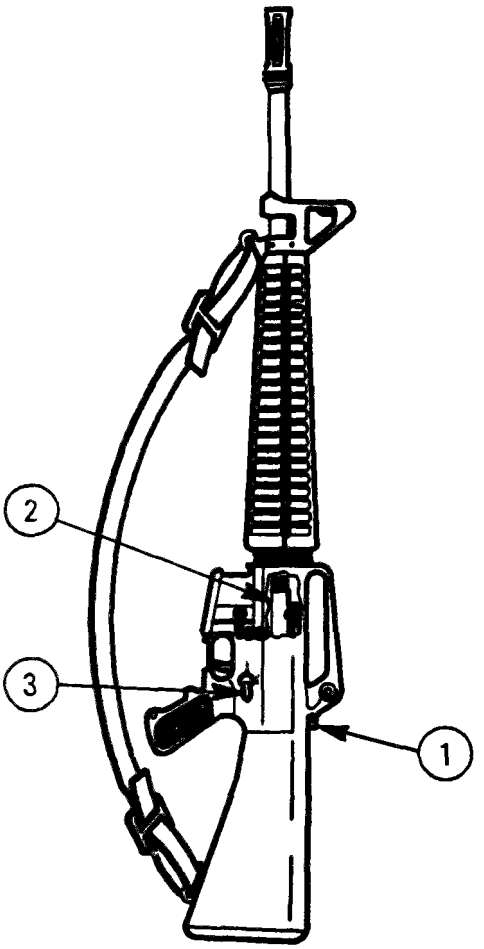
Normal cleaning (PMCS) of an inactive weapon will be performed every 90 days. Should the unit armorer detect corrosion on a weapon prior to the end of the 90-day period, the PMCS should be performed immediately.

Solid Film Lubricant (SFL) is the authorized touch up for the M16/M16A1 Rifle and may be used on up to one third of the exterior finish of the weapon.
FOR CONUS USE ONLY: Solid Film Lubricant may be used as a touch up without limitation on the upper receiver and barrel assembly. This is to say that units which DO NOT fall under the category of Divisional Combat Units or rapid deployment type units may have up to 100% of the exterior surface of the Upper Receiver and Barrel Assembly protected with SFL. Prior to application of SFL the surface must be thoroughly clean and inspected for corrosion and/or damage. If corroded or damaged the part must be repaired or replaced prior to application of SFL. Continued use under combat conditions would result in an unprotected surface when the SFL wears off. This would result in a large light reflecting surface and accelerated deterioration of the unprotected surface. Therefore, Divisional Combat Units and units which fall under the definition of Rapid Deployment type must adhere to the limitation of NOT over 1/3 of their exterior surface covered by SFL.

Quarterly	Cartridge magazine (serviceability check)	a. Disassemble as in operators manual Inspect tube (1) for bulges, dents, or damaged feeder lips (2). Inspect spring (3) and follower (4) for kinks or damage.	SH - Replace the magazine if any of these conditions exist.
		b. Reassemble magazine and check for binding during operation of follower (4).	SH - Replace the magazine if the follower binds

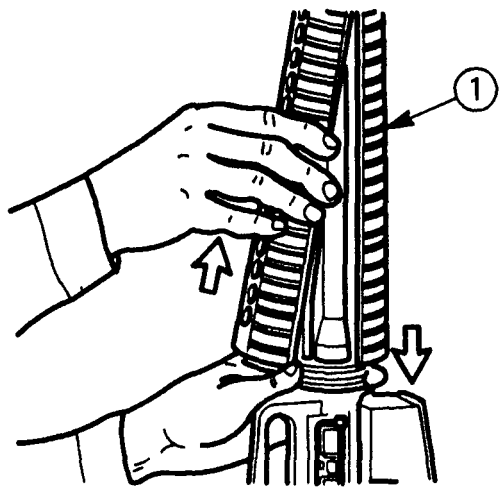


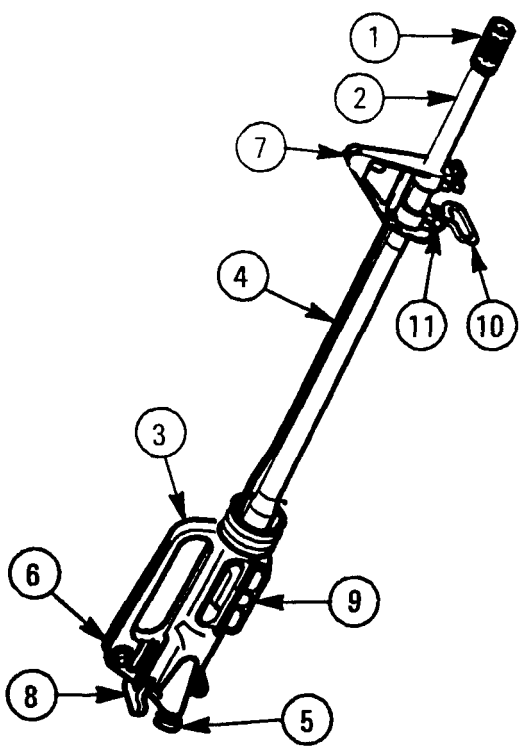
PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cont)

Item No.	Interval	Item To Be Checked Or serviced	Procedure	Not Fully Mission Capable If:
2	Quarterly	Charging handle assembly and selector lever.	**WARNING** **If the weapon fails any of the following selector lever teats, evacuate it to Direct Support Maintenance. Continued use of the weapon could result in injury to, or death of, personnel.**	
			Pull charging handle (1) to rear. Check that chamber is clear. Let bolt and bolt carrier (2) close. Leave hammer in cocked position. Do not pull trigger.	D - Charging handle must lock in place when in the forward position.
			Place selector lever (3) in SAFE position. Pull trigger. Hammer should not fall.	D - Hammer falls.
			NOTE **For the purpose of the following test "SLOW" is defined as 1/4 to 1/2 the normal rate of trigger release.**	
			Place selector lever (3) in SEMI position. Pull trigger. Hammer should fall.	D - Hammer does not fall.
			Hold trigger to the rear, charge weapon, and release the trigger with a slow, smooth motion, without hesitations or stops, until the trigger is fully forward. (An audible click should be heard.) Hammer should not fall.	D - Hammer falls.
			Repeat the above SEMI position test five times.	D - The weapon malfunctions during any of these five tests.
			Place in AUTO position. Charge weapon and pull trigger. Hammer should fall.	D - Hammer does not fall.
			Hold trigger to the rear, charge weapon, and release trigger. Pull trigger. Hammer should not fall.	D - Hammer falls.
			NOTE **Automatic sear should have released hammer while holding trigger in the pulled position before releasing and pulling the trigger.**	
			With hammer in forward position, attempt to place the selector lever (3) in SAFE position using finger/thumb pressure only..	**D - Finger/thumb pressure moves fire control selector to SAFE position.**

PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cont)

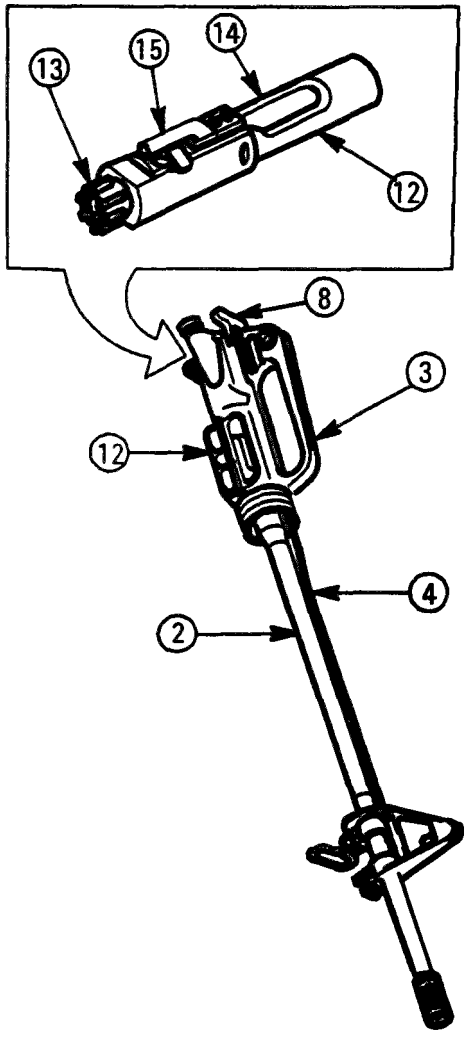
Item No.	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:
3	Quarterly	Upper receiver and barrel assembly (handguards)	**CAUTION** **Do not use screwdriver or any other tool when removing the handguards, doing so may damage the handguard and/or slip ring.** **NOTE** **Refer to operator's manual for "buddy system" procedure on removing handguards.** Remove and inspect handguards (1) internally and externally for cracks and/or damage. Cracks up to one inch in length are acceptable providing they do not extend into the handguard retaining flange or adversely affect weapon operation, operator safety, or proper retention of handguard.	SH - Discard and replace the handguard assembly (1) if the heatshield is loose enough to rattle when installed on the rifle or it fails the inspection.
4	Quarterly	Upper receiver and barrel assembly (serviceability check)	**WARNING** **Dry cleaning solvent is flammable and toxic and should be used in a well-ventilated area. The use of rubber gloves is necessary to protect the skin when washing rifle parts.** Release takedown pins and open and separate receivers Hand check flash suppressor (1) for looseness on barrel (2), then hand check barrel for looseness on upper receiver (3). Check gas tube (4), forward assist (5), and rear sight (6) for damage. Using finger pressure, check the rear sight for firmness. The rear sight spring shall retain the rear sight in either position with Firmness. Check front sight post, plunger, and spring (7) for damage and corrosion. Clean and lubricate them (p 2-22). Check charging handle (8) and ejection port cover (9) for defects and proper function. Check sling swivel (10) and pin/rivet(11) for damage and proper function.	D - If flash support or barrel are loose, evacuate to direct support maintenance. **D - If barrel is loose on upper receiver, evacuate to support maintenance.** SH - If damaged, evacuate to direct support maintenance. **D - Charging handle (8) is defective.** **SH - Replace defective components as necessary.**





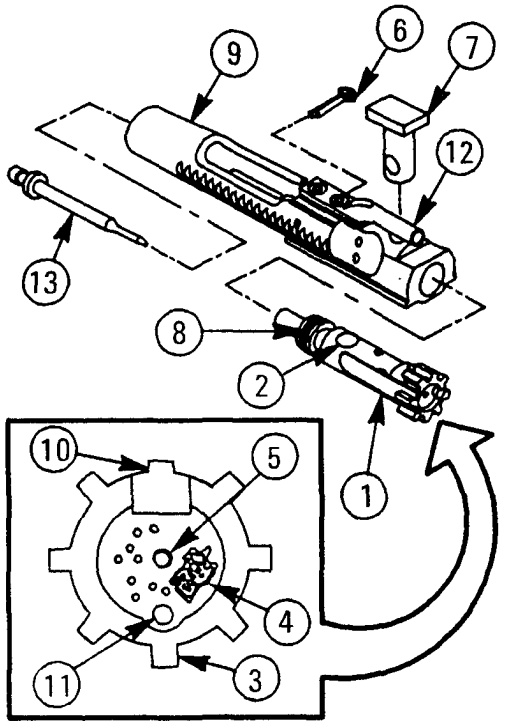
PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cent)

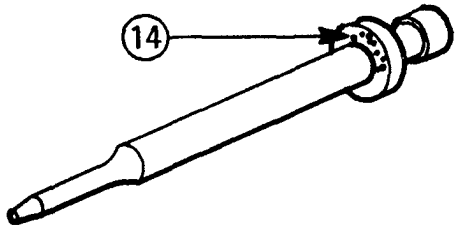
Item No.	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission capable If:
			CAUTION **Do not use a wire brush to roughen surfaces. Use a well-ventilated area during cleaning and application of solid film lubricant. If solid film lubricant comes in contact with moving parts or functioning surfaces of the rifle, remove lubricant immediately by washing with dry cleaning solvent.** **NOTE** **Shiny metal exterior surfaces of the rifle should be recoated with solid film lubricant (item 19, app D). Clean surface with dry cleaning solvent (Item 15, app D), dry, roughen with abrasive cloth (item 12, app D) and apply solid film lubricant**	
4	Quarterly	Upper receiver and barrel assembly (serviceability check) (cent)	Inspect upper receiver (3) finish for scratches or worn shiny spots.	SH - If scratched or worn, to allow a shiny, light reflecting surface, apply solid film lubricant.
			If scratched or worn shiny in spots, disassemble and remove all lubricant from surface with dry cleaning solvent (item 15, app D). Wear rubber gloves (item 16, app D) and use a wash pan (item 22, app D) to apply solvent. Let parts dry thoroughly. Roughen the surface using abrasive cloth (item 12, app D) and apply solid film lubricant (item 19, app D). Allow 16 to 24 hours to dry before handling.	
			Hold barrel (2) at 40-degree angle (muzzle down). Pull charging handle (8) to rear. Hold bolt carrier assembly (12) to rear and push charging handle forward. Release bolt carrier assembly (1 2). The bolt carrier assembly should close and lock under its own weight. If it does not, remove the bolt (13) from the carrier(14) and slide the carrier (14) (without bolt) back and forth in the upper receiver and barrel assembly. If the gas tube (4) hits the carrier key (15) or if the gas tube binds on the carrier key, try to correct the malfunction by adjusting (slightly bending) the gas tube in the area of the handguards.	D - If this does not correct the malfunction, evacuate to direct support maintenance.



PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cont)

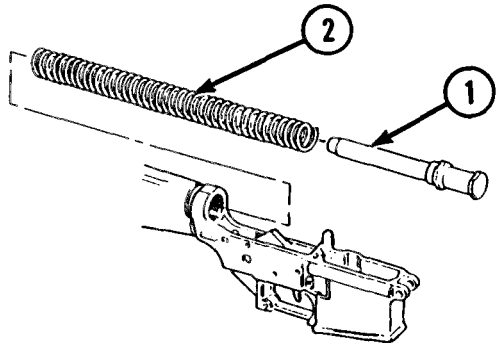
Item No.	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			WARNING **Below direct support maintenance, do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.**	
5	Quarterly	Bolt carrier assembly (serviceability check)	Remove and disassemble. Visually inspect bolt assembly (1) for cracks, especially in the area of the cam pin hole (2). Check for cracks on locking lugs (3), for a cluster of pits or chipped bolt face (4), and for an elongated firing pin hole (5).	ID - If defects are found, evacuate to direct support maintenance for repair.
			Check for missing or broken retaining pin (6)/bolt cam pin (7), or cracks on bolt cam pin.	ID - Replace retaining pin/bolt cam pin.
			Check for worn bolt rings (8). Insert the bolt assembly (1) into the bolt carrier (9). Turn bolt carrier assembly (9) so the bolt assembly (1) points down. The bolt must not drop out.	ID - If the bolt assembly drops out of the bolt carrier due to its own weight, evacuate to direct support maintenance for repair (usually bolt ring replacement).
			Check extractor and spring (10) and ejector and spring (1 1) for dirt and serviceability.	SH - Clean, lubricate (p 2-22) and assemble.
			NOTE **Do not remove extractor spring assembly from extractor except for replacement.**	D - Replace extractor and spring, and ejector and spring as necessary.
			Check bolt carrier (9) and carrier key (12) for damage and looseness.	D - If bolt carrier or carrier key is damaged or carrier key is loose, evacuate to direct support maintenance.
			NOTE **Dented carrier keys may be repaired (p 2-25) using the fabricated key tool (fig E-3, app E).**	
			Check firing pin (13) for chips or breaks.	D - If firing pin is damaged, evacuate to direct support maintenance.
			Pits or wear in area illustrated is permissible (14).	

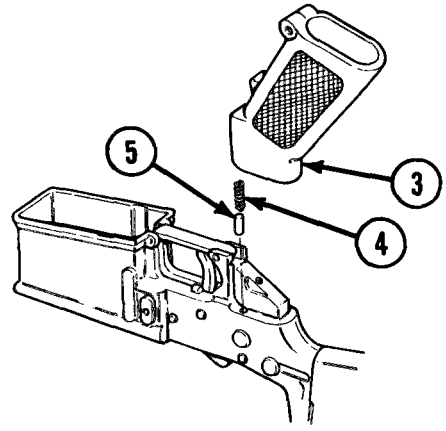


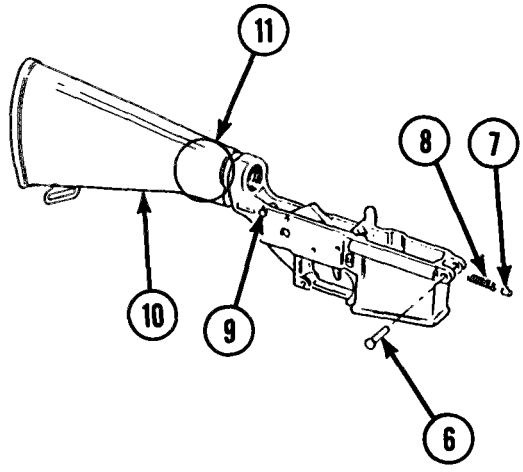


PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cont)

Item No.	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:
6	Quarterly	Lower receiver and extension assembly (serviceability check)	Remove buffer (1) and action spring (2). Check buffer for cracks.	SH - Replace buffer if racked.
			Check action spring (12) for kinks and free length. Free length should be 11 3/4 minimum to 13 1/2 maximum inches.	SH - If kinked or incorrect length replace. Do not attempt to adjust spring length.
			Remove rifle grip (3), spring (4), safety detent (5), pivot pin (6), detent (7), and spring (8). Clean and lubricate metal components (p 2-22). Also clean and lubricate pivot pin holes and spring/detent holes.	D - Replace defective/damaged components as necessary.
			Compress helical compression spring and takedown pin detent (9) using a jeweler's screwdriver or fabricated tool depicted in appendix E (fig E-2).	D - If helical compression spring will not compress, or takedown pin detent will not return to its original position, refer to page 2-41 for repair procedure.
			Lubricate (p 2-22) helical compression spring and takedown pin detent (9) by placing one drop of lubricant on detent and lowering the buttstock assembly (10) to vertical position. Allow the lubricant to work its way around the helical compression spring and takedown pin detent (9).	
			Check buttstock assembly (10) components for damage.	
			Under the following conditions, hairline cracks (no chipped away material allowed) originating from the buttplate end of the buttstock are acceptable without repair.	D - Replace damaged components as necessary.
			a. One hairline crack, not to exceed one inch in length, per side of buttstock.	
			b. Two additional hairline cracks up to 1/4 inch in length, per side of buttstock.	
			c. A total of three cracks per side of the buttstock, originating from the buttplate end, are allowable.	
			Cracks in the critical area (11) at the front end of the buttstock are not acceptable.	

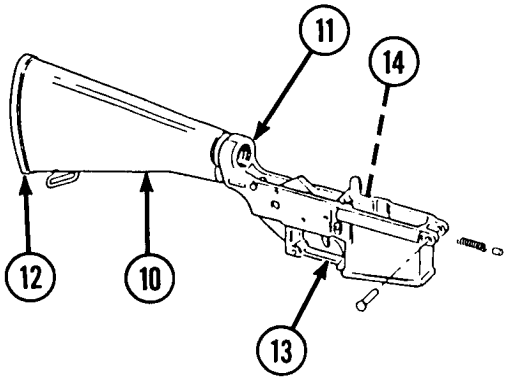




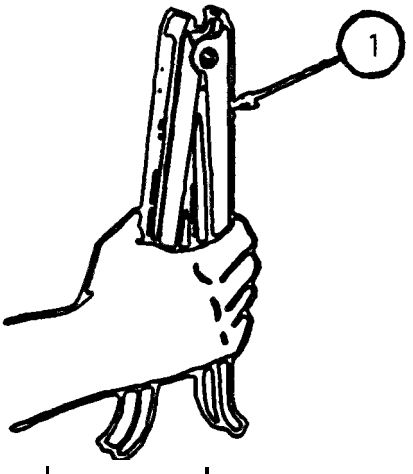


PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cont)

Item No.	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:
6	Quarterly	Lower receiver and extension assembly (serviceability check) (cent)	Check buttstock assembly (10) for forward to rear movement and/or a 1 /32" gap between the buttstock assembly (10) and the lower receiver (11). If forward to rear movement and/or a 1/32" gap appears, tighten butt cap screw. If still not tight, replace buttplate.	
			If movement and/or gap remains, a loose lower receiver extension may be the cause.	D If a loose lower receiver extension is suspected, remove buttstock (p 2-45) and check for tightness. If loose, evacuate to direct support maintenance for repair, Clean and lubricate all components before reassembly.
			NOTE **Small amounts of side-to-side, up-and-down or rotational movement of the buttstock assembly is acceptable without repair.**	
			Replace the butt plate (12) if any of the following conditions exist:	
			(1) Cracks around the mounting holes are visible when installed on the weapon.	SH - If defective, replace necessary parts.
			(2) Cracks or separations around the door assembly are visible when the door assembly is closed.	
			(3) If any crack is in excess of 1/4 inch in length and extends through the butt plate (12).	
			(4) The butt plate (12) should not be removed other than for repair or replacement of parts at which time a new, self-locking screw must be used.	
			Function check the magazine catch (13) and bolt catch (14).	D - If defective, evacuate to direct support maintenance.
			Check lower receiver (11) finish for scratches and worn shiny spots.	
			NOTE **If a M16/M16A1 Rifle LOWER RECEIVER is missing one third or more of its exterior protective finish, resulting in an unprotected/light reflecting surface, it is candidate for overhaul. This missing finish will be considered a shortcoming. This shortcoming requires action to obtain a replacement weapon. Once a replacement has been received, evacuate the original weapon to depot for overhaul.**	



PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M16/M16A1 RIFLE (Cont)

Item No.	Interval	item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:
6	Quarterly	Lower receiver and extension assembly (serviceability check) (cont)	If scratched or worn shiny in spots, recoat with solid film lubricant (item 19, app D) as stated in item 4 (p 2-7).	
7	Quarterly	M16/M16A1 Rifle	Assemble as in operators manual.	
			Check for broken, missing, or damaged parts and check over all general appearance.	D - Replace parts as required and authorized, or evacuate to direct support maintenance for repair.
			Check small arms sling for damage.	SH - Replace if damaged.
8	Quarterly	Bipod assembly M3 (serviceability check)	Check spring tension for retention to rifle barrel. Check legs (1) for damage.	SH - If defective, replace M3 bipod.
				
9	Quarterly	Annual DS safety and serviceability inspection and gaging	Check the DD Form 314 to insure annual DS safety and serviceability inspection and gaging has been done and that the next gaging and inspection is scheduled.	D - If annual gaging has not been performed within the last year, notify direct support maintenance.

Section IV. TROUBLESHOOTING

2-8. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the 5.56mm Rifle M16 and M16A1, Each malfunction for the individual part or assembly is followed by a list of tests or inspections which will help you to determine the corrective actions to take. You should perform the tests, inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, see individual repair sections for maintenance instructions on each major assembly.

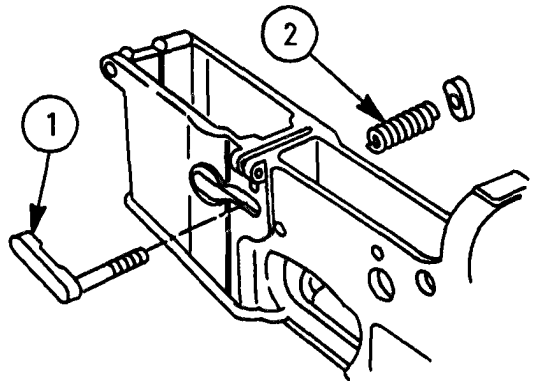
2-9. TROUBLESHOOTING PROCEDURES. Refer to troubleshooting table for malfunctions, tests, and corrective actions. The symptom index is provided for a quick reference of symptoms covered in the table.

SYMPTOM INDEX

	Troubleshooting Procedures Page
Failure of magazine to lock in weapon	2-13
Failure to feed	2-13
Failure to chamber	2-14
Failure to lock	2-14
Failure to fire	2-15
Failure to unlock	2-15
Failure to extract	2-16
Failure to eject	2-16
Failure to cock	2-16
Short recoil	2-17
Weapon cannot be zeroed	2-18
Failure to cycle with selector lever set on AUTO	2-19
Fires two rounds with one pull of trigger with selector lever set on SEMI (double firing)	2-19
Fires with selector lever on SAFE or when trigger is released with selector lever on SEMI	2-19
Bolt fails to lock to rear after firing last round	2-20

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. FAILURE OF MAGAZINE TO LOCK IN WEAPON.



Step 1. Dirty or corroded magazine catch (1).

Disassemble and clean.

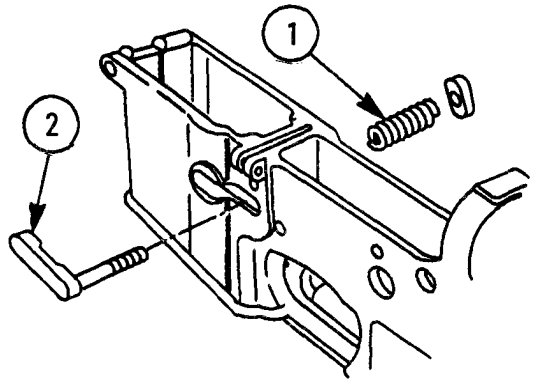
Step 2. Defective magazine catch spring (2).

Replace spring (2).

Step 3. Worn or broken magazine catch (1).

Replace magazine catch (1).

2. FAILURE TO FEED.



Step 1. Magazine catch spring (1) weak or broken.

Evacuate to direct support maintenance.

Step 2. Magazine catch (2) defective.

Evacuate to direct support maintenance.

Step 3. Magazine catch (2) out of adjustment (will not retain magazine).

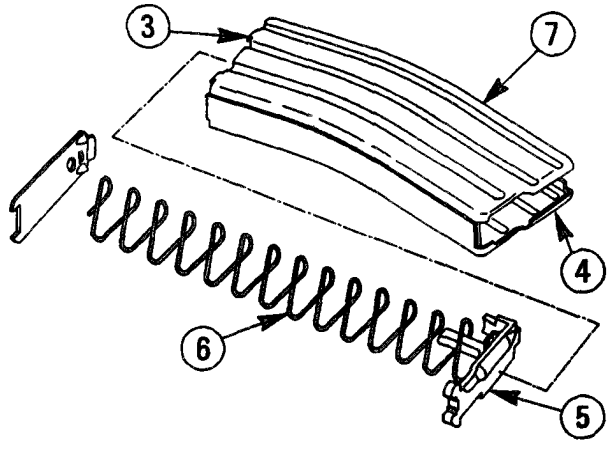
Refer to operator's manual

Step 4. Magazine catch notch (3) defective.

Replace magazine assembly.

Step 5. Magazine lips (4) burred or broken.

Replace magazine.



Step 6. Magazine follower (5) defective, or binds during operation.

Replace magazine.

Step 7. Magazine spring (6) weak or broken.

Replace magazine.

Step 8. Magazine tube (7) dented.

Replace magazine.

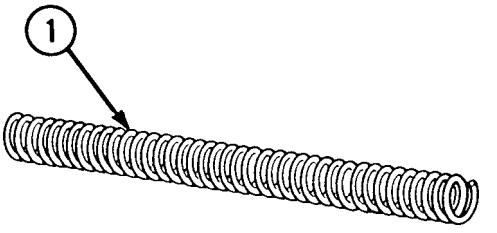
Step 9. Short recoil.

Refer to page 2-17.

TROUBLESHOOTING (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. FAILURE TO CHAMBER.



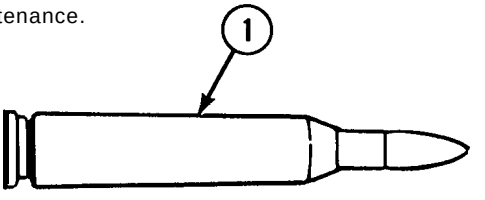
Step 1. Weak or broken action spring (1) (free length 11 3/4 inches minimum to 13 1/2 inches maximum).

Replace action spring (1) (p 2-45).

Step 2. Obstruction in bore/chamber.

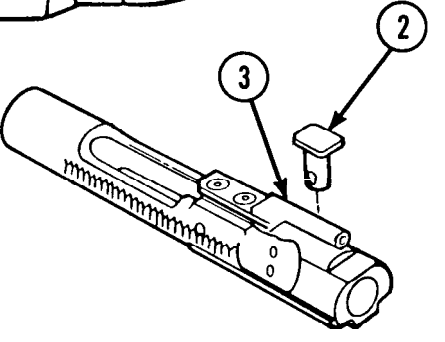
Remove obstruction; if unable to remove obstruction, evacuate to direct support maintenance.

4. FAILURE TO LOCK.



Step 1. Dirty or damaged ammunition (1).

Replace ammunition.

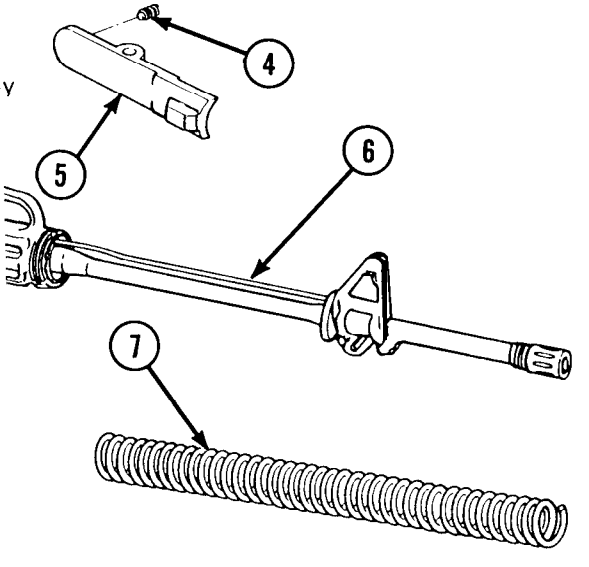


Step 2. Bolt cam pin (2) broken or missing.

Replace bolt cam pin (p 2-24).

Step 3. Loose or damaged bolt carrier key (3).

Evacuate to direct support maintenance. Dented carrier keys (3) may be repaired (p 2-22) using the fabricated key tool (fig E-3, app E).



Step 4. Improperly assembled extractor spring assembly (4) to extractor (5).

Assemble correctly (p 2-29).

Step 5. Bent gas tube (6).

Adjust/bend gas tube in area of the handguard to its original configuration. If the gas tube cannot be repaired to its original configuration, evacuate weapon to direct support maintenance.

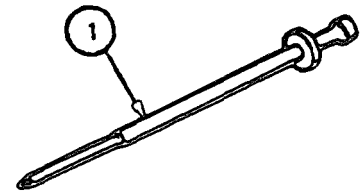
Step 6. Weak or broken action spring (7).

Replace action spring (7) (p 2-45).

TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. FAILURE TO FIRE.

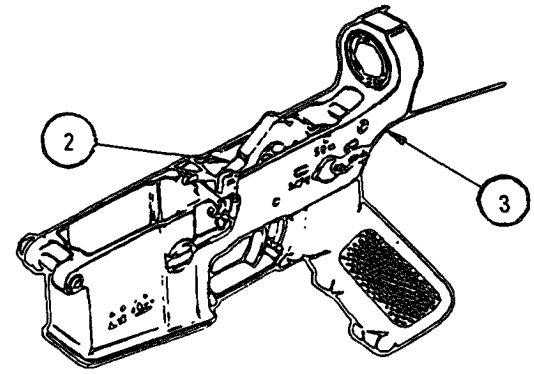


Step 1. Broken, chipped, or deformed firing pin (1).

Evacuate to direct support maintenance.

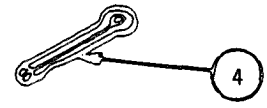
Step 2. Firing mechanism (2) and/or lower receiver assembly (3) improperly assembled or has worn, broken, or missing parts.

Evacuate to direct support maintenance

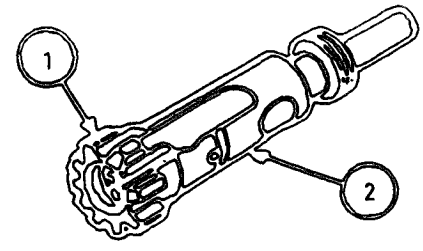


Step 3. Broken, missing, or defective retaining pin (4).

Replace retaining pin (p 2-24).



6. FAILURE TO UNLOCK.



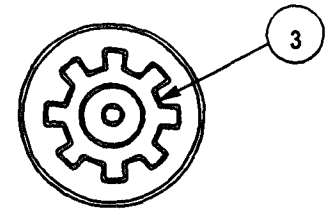
Step 1. Burred locking lugs (1) on bolt assembly (2).

Evacuate to direct support maintenance.

Step 2. Burred locking lugs (3) on barrel extension.

Evacuate to direct support maintenance.

Step 3. See short recoil (p 2-17).



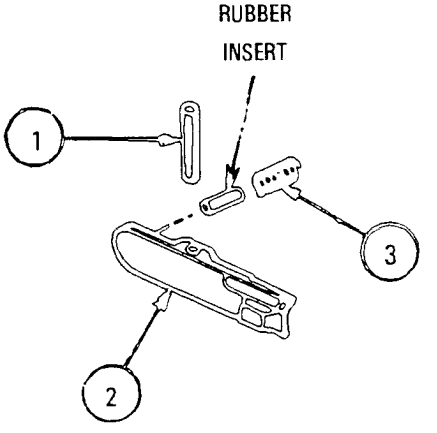
Step 4. Broken bolt assembly (2).

Evacuate to direct support maintenance.

TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7. FAILURE TO EXTRACT.



Step 1. Defective extractor pin (1), extractor (2), and/or extractor spring assembly (3).

Replace extractor pin (1), extractor (2), and/or extractor spring assembly (3) (p 2-24).

Step 2. Short recoil.

Refer to page 2-17.

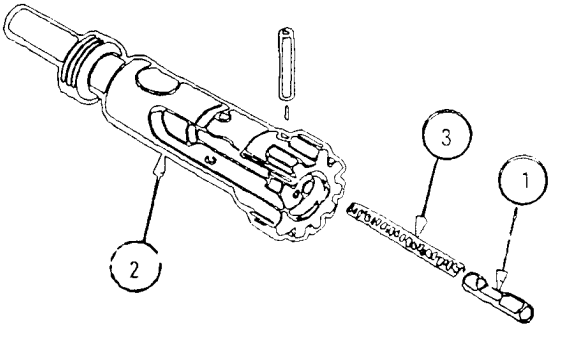
NOTE

Rubber insert and spring are an assembly. Illustration shows insert out of assembly for clarification only. Do not remove rubber insert from spring.

Step 3. Badly pitted chamber.

Evacuate to direct support maintenance.

8. FAILURE TO EJECT.



Step 1. Broken or missing cartridge ejector (1).

Replace (p 2-29).

Step 2. Ejector (1) stuck in bolt body (2).

Disassemble and clean (p 2-29).

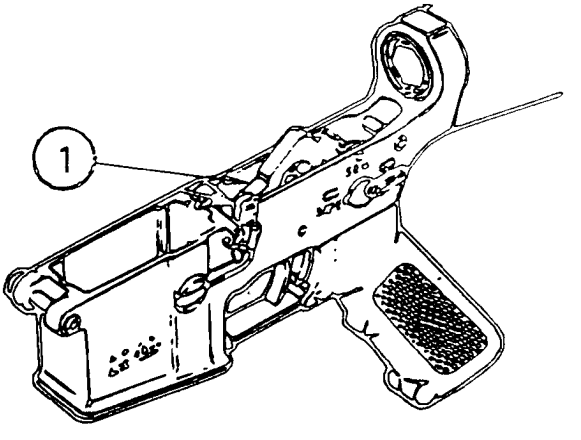
Step 3. Weak, broken or missing ejector spring (3).

Replace (p 2-29).

Step 4. Short recoil.

Refer to page 2-17.

9. FAILURE TO COCK.



Step 1. Worn, broken, or missing parts of firing mechanism (1).

Evacuate to direct support maintenance.

Step 2. Short recoil.

Refer to page 2-17.

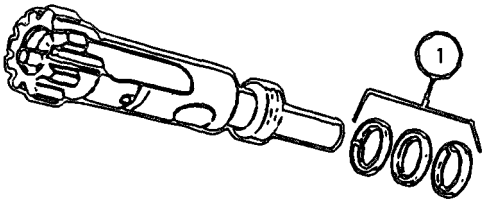
TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

10. SHORT RECOIL.

Step 1. Improper gap space or worn, missing or broken bolt rings (1).

Evacuate to direct support maintenance if rings are worn, broken or missing (p 2-30).



Step 2. Partially plugged gas system because of carbon build up in gas tube.

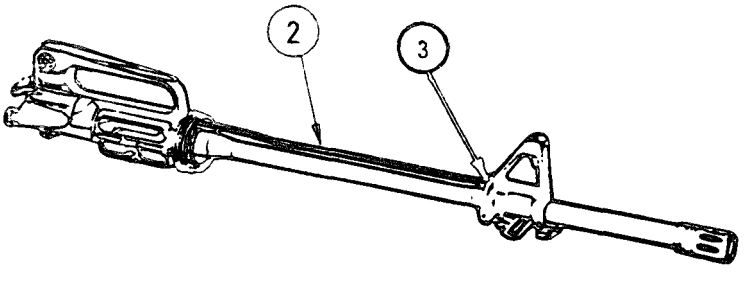
Evacuate to direct support maintenance.

Step 3. Carbon buildup in the narrow passage of the bolt carrier key.

Clean with CLP (item 9, app D) or RBC (item 11, app D). See operator's manual.

Step 4. Gas leakage caused by broken or loose gas tube (2) around front sight base (3).

Evacuate to direct support maintenance.

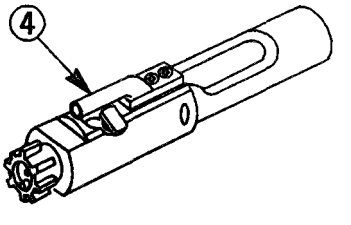


Step 5. Improper alignment of gas tube (2) and carrier key (4).

Refer to page 2-24.

Step 6. Loose carrier key (4).

Evacuate to direct support maintenance.



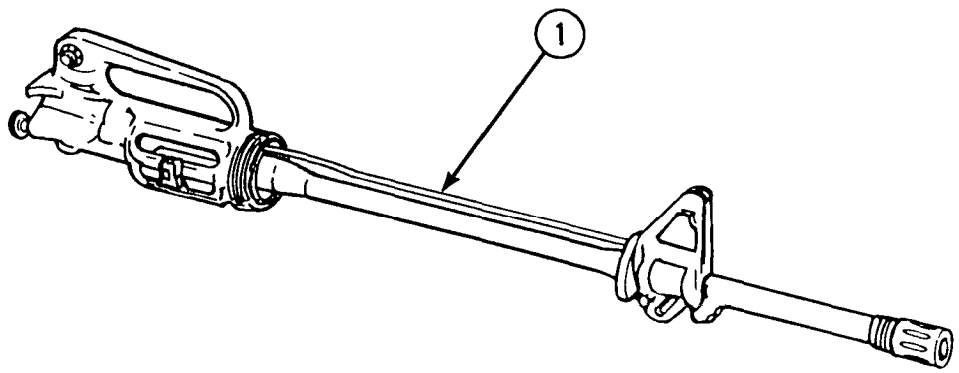
TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. WEAPON CANNOT BE ZEROED.

Step 1. Bent or bulged rifle barrel assembly (1).

Evacuate to direct support maintenance.



Step 2. Barrel assembly out of alignment with rear sight on upper receiver.

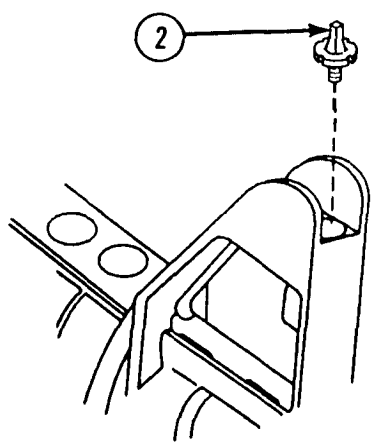
Evacuate to direct support maintenance.

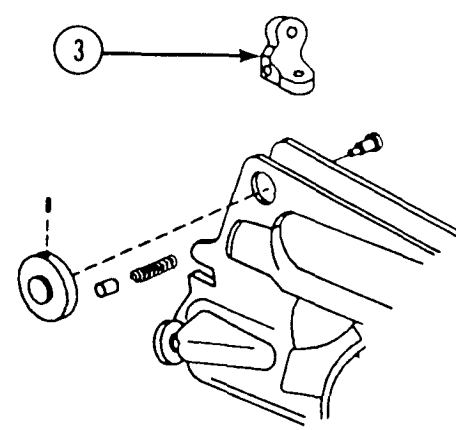
Step 3. Corroded front sight post (2).

Disassemble, clean and lubricate (p 2-37).

Step 4. Corroded rear sight (3).

Clean and lubricate. Evacuate to direct support maintenance.





TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

12. FAILURE TO CYCLE WITH SELECTOR LEVER SET ON AUTO.

Faulty selector lever (1).

Evacuate to direct support maintenance.

13. FIRES TWO ROUNDS WITH ONE PULL OF TRIGGER WITH SELECTOR LEVER (1) SET ON SEMI (DOUBLE FIRING).

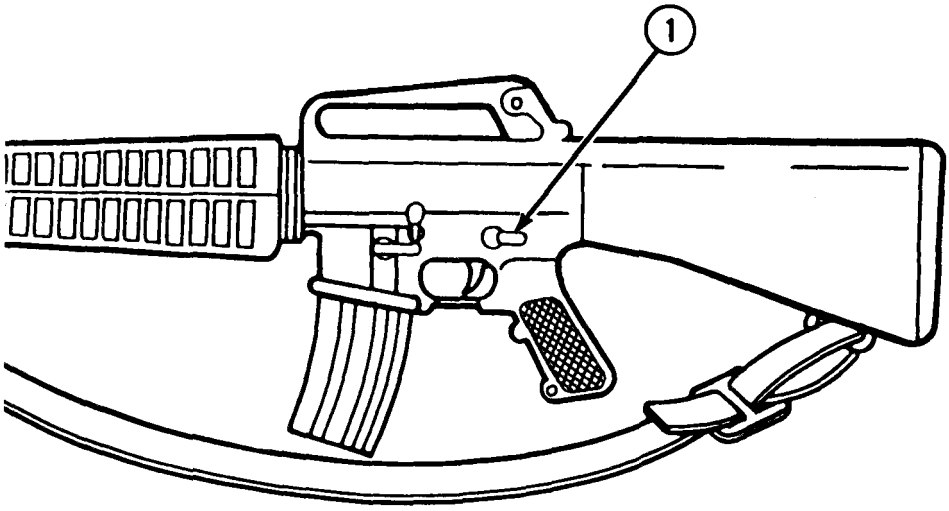
Perform function test.

If any part of function test (p 2-53) fails, evacuate to direct support maintenance.

14. FIRES WITH SELECTOR LEVER (1) ON SAFE OR WHEN TRIGGER IS RELEASED WITH SELECTOR LEVER ON SEMI.

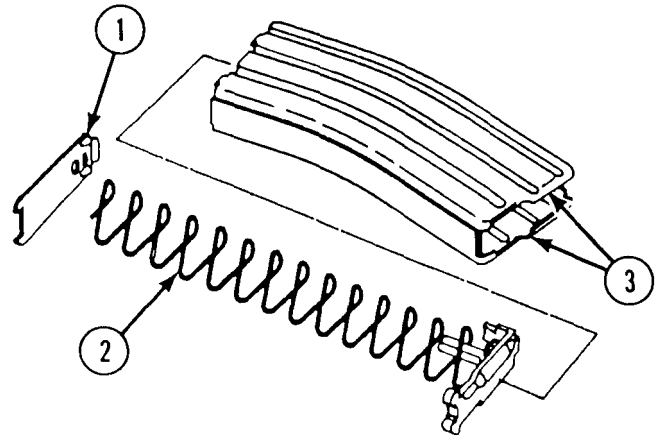
Worn, broken, or missing parts of firing mechanism.

Evacuate to direct support maintenance



MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

15. BOLT FAILS TO LOCK TO REAR AFTER FIRING LAST ROUND



Step 1. Magazine follower (1) worn or broken.

Replace magazine.

Step 2. Magazine spring (2) weak or broken.

Replace magazine.

Step 3. Magazine feeder lips (3) bent or broken,

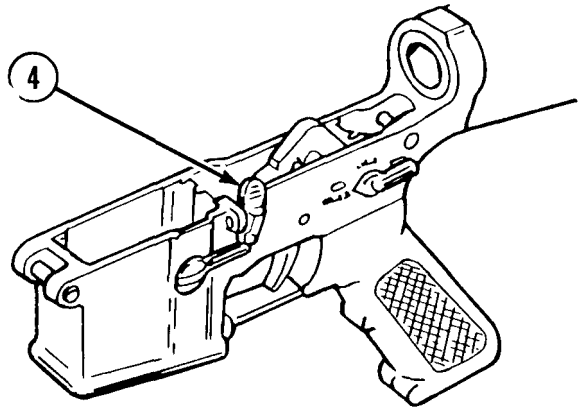
Replace magazine.

Step 4. Magazine follower (1) binds during operation.

Replace magazine.

Step 5. Broken bolt catch (4) and/or spring,

Evacuate to direct support maintenance.



Section V. DECONTAMINATION OF RIFLES AND ARMS ROOMS

2-10. DECONTAMINATION OF SIGHTS ACTIVATED WITH TRITIUM (H3).

a. Identification. Tritium sights will be marked with the assembly data and the radiation symbol and stamped H3, 9 mc .

b. Damage Determination. Evidence of a break in the glass container for the H3 will be a lack of illumination (assuring the expiration data for the sight has not been exceeded). Radiation from the sight is extremely low and CANNOT be detected with standard issue radiation detectors, i.e., AN/PDR-27.

c. Contamination. The tritium isotope used in the low light level sight is in a gaseous state and will rapidly diffuse into the atmosphere in the event of breakage. Very little residual contamination should be left on the rifle. All illumination will cease upon loss of H3 gas.

WARNING

Dry cleaning solvent is flammable and toxic and should be used in a well-ventilated area. The use of rubber gloves is necessary to protect the skin when washing rifle parts.

d. Decontamination. When a broken sight is found, the sight MUST be removed and turned in for disposal in accordance with AR 385-11. After removing the sight, the rifle should be cleaned with dry cleaning solvent (item 15, app D). Wear rubber gloves (item 16, app D) and use a wash pan (item 22, app D) to apply solvent. Let dry, then lubricate (p 2-22).

e. Requirements. Because its small volume of gas and its low energy of emitted radiation. H3 does not pose a health hazard to the user. Current Army regulations NRC license conditions and Title 10, Code of Federal Regulations, Part 20 require that the above actions be carried out.

2-11. DECONTAMINATION OF SIGHTS ACTIVATED WITH PROMETHIUM (PM 147).

NOTE

PM 147 is no longer available for issue and must be replaced. It is being replaced with tritium (H3).

a. General. When a sight activated with promethium (PM 147) is found, the sight MUST be removed and turned in for disposal in accordance with AR 385-11. Contact the local RPO.

b.Identification. Promethium sights are marked with the assembly date, radiation symbol, and PM 147, 1 mc.

c. Decontamination. If a sight activated with promethium (PM 147) is found, conduct a survey under the direction of the local RPO. Decontaminate as required in accordance with local procedures.

Section VI. MAINTENANCE PROCEDURES

2-12. INITIAL SETUP. The following will reduce the space required for the initial setup portion of the maintenance procedures.

a. Materials Parts required are not listed unless they apply to the procedure.

b. Personnel Required is listed only if the task requires more than one person. If Personnel Required is not listed, it means one person can do the job.

c. Do not scratch, etch or stamp numbers, letters or any other information on bolt, bolt carrier, buttstock or other piece parts.

d. The normal standard equipment condition is that the item is removed from end item or next higher assembly and is in the assembled condition. Equipment Condition is not listed unless some other condition is required.

e. The approximate time required is listed on the applicable Maintenance Allocation Chart (MAC).

f. When the term evacuate to direct support maintenance is used, the entire weapon must be evacuated.

NOTE

Solid Film Lubricant (SFL) is the authorized touch up for the M16/M16A1 Rifle and may be used on up to one third of the exterior finish of the weapon.
FOR CONUS USE ONLY: Solid Film Lubricant may be used as a touch up without limitation on the upper receiver and barrel assembly. This is to say that units which DO NOT fall under the category of Divisional Combat Units or rapid deployment type units may have up to 100% of the exterior surface of the Upper Receiver and Barrel Assembly protected with SFL. Prior to application of SFL the surface must be thoroughly clean and inspected for corrosion and/or damage. If corroded or damaged, the part must be repaired or replaced prior to application of SFL. Continued use under combat conditions would result in an unprotected surface when the SFL wears off. This would result in a large light reflecting surface and accelerated deterioration of the unprotected surface. Therefore, Divisional Combat Units and units which fall under the definition of Rapid Deployment type must adhere to the limitation of NOT over 1/3 of their exterior surface covered by SFL.

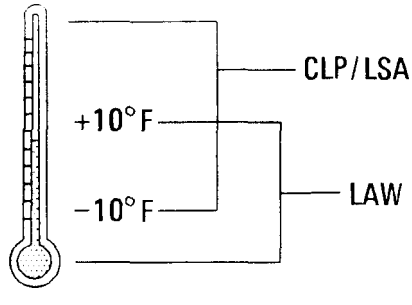
2-13. LUBRICATION GENERAL.

a. Whenever the term or instruction "'lubricate" is cited in this TM, it is to be Interpreted to mean CLP, (item 9, app D), LSA (item 21, app D), or LAW (item 20, app D) can be utilized as applicable The following constraints must be adhered to:

b. Under all but the coldest arctic conditions. LSA or CLP are the lubricants to use on the weapon Either may be used at -10°F and above. However, do not use both on the same weapon at the same time.

c. LAW is the lubricant to use during cold arctic conditions, +10° F and below.

d. Any of the lubricants may be used from -10°F to +10°F.



e. Do not mix lubricants on the same weapon. The weapon must be thoroughly cleaned during change from one lubricant to another. Dry Cleaning Solvent (SD) (item 15, app D) is recommended for cleaning during change from one lubricant to another.

f. Rifle Bore Cleaner (RBC) (item 11, app D), may be used to remove carbon buildup in the bore and other portions of the weapon.

2-14. MAJOR COMPONENTS OF M16/16A1 RIFLE.

This task covers disassembly.

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

References
TM 9-1005-249-10 (operator's manual)

Equipment Condition
Weapon assembled.

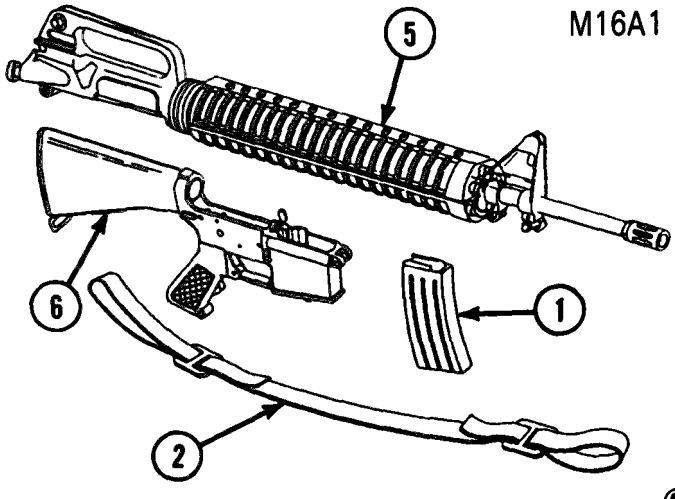
General Safety Instructions
Before starting an inspection, be sure to clear the weapon. Do not keep live ammunition near the work area.

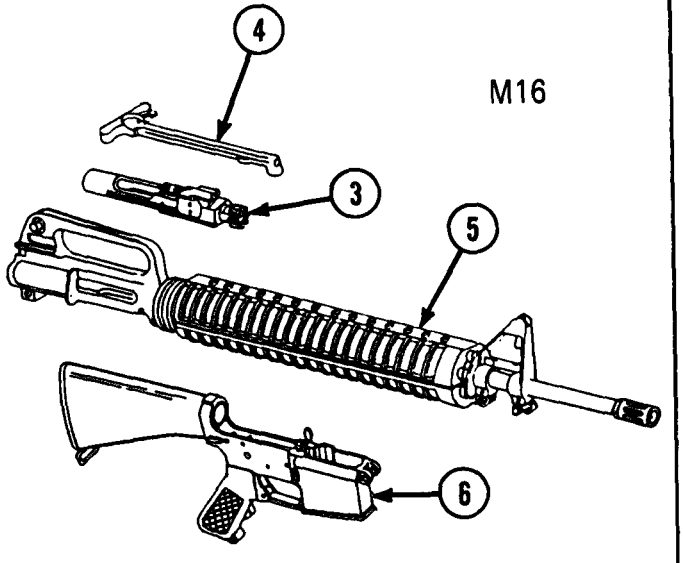
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

Before starting an inspection on a weapon equipped with a low light level sight, check for damage to the sight and decontaminate if required. See procedures on page 2-21.

Below direct support maintenance, do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.

DISASSEMBLY





a. Refer to operator's manual.

b. Remove cartridge magazine (1), small arms sling (2), bolt carrier assembly (3), charging handle assembly (4), upper receiver and barrel assembly (5), from lower receiver and extension assembly (6).

2-15. BOLT CARRIER ASSEMBLY.

This task covers:

a. Disassembly
b. Cleaning
c. Inspection/Repair
d. Lubrication
e. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)
Key tool (fig E-3, app E)

Materials/Parts
Cleaner, lubricant and preservation (CLP) (item 9, app D)
Cleaning compound, rifle bore (CLP) (item 11, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA)(item 21, app D)

Equipment Condition
Bolt carrier assembly removed

Reference
TM 9-1005-249-10 (Operator's manual)

General Safety Instructions
Bolt cam pin must be installed or weapon will blow up while firing in the first round. If the bolt cam pin is not installed, injury to, or death of, personnel may result.

Do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.

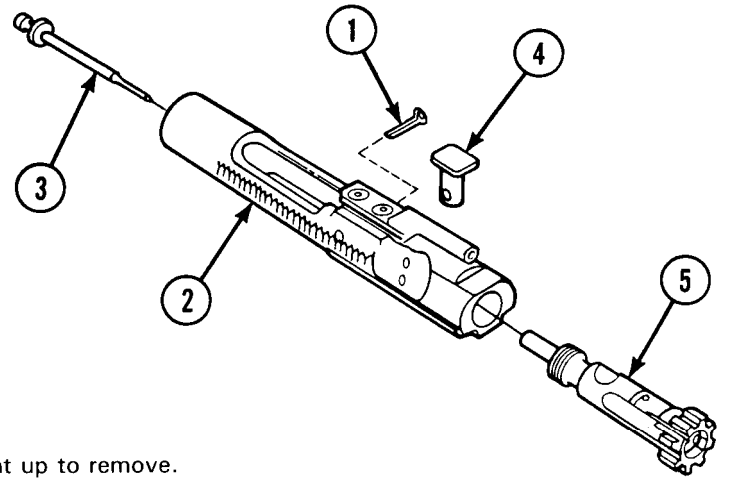
a. DISASSEMBLY

WARNING

Do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of personnel.

CAUTION

Do not spread or close legs of firing pin retaining pin (1).



1. Remove firing pin retaining pin (1). Lower rear end of key and bolt carrier assembly (2) and catch firing pin (3) as it drops out.
2. Rotate bolt cam pin (4) 1/4 turn and lift straight up to remove.
3. Remove bolt assembly (5) from key and bolt carrier assembly (2).

NOTE

For disassembly of bolt assembly (5), see page 2-29.

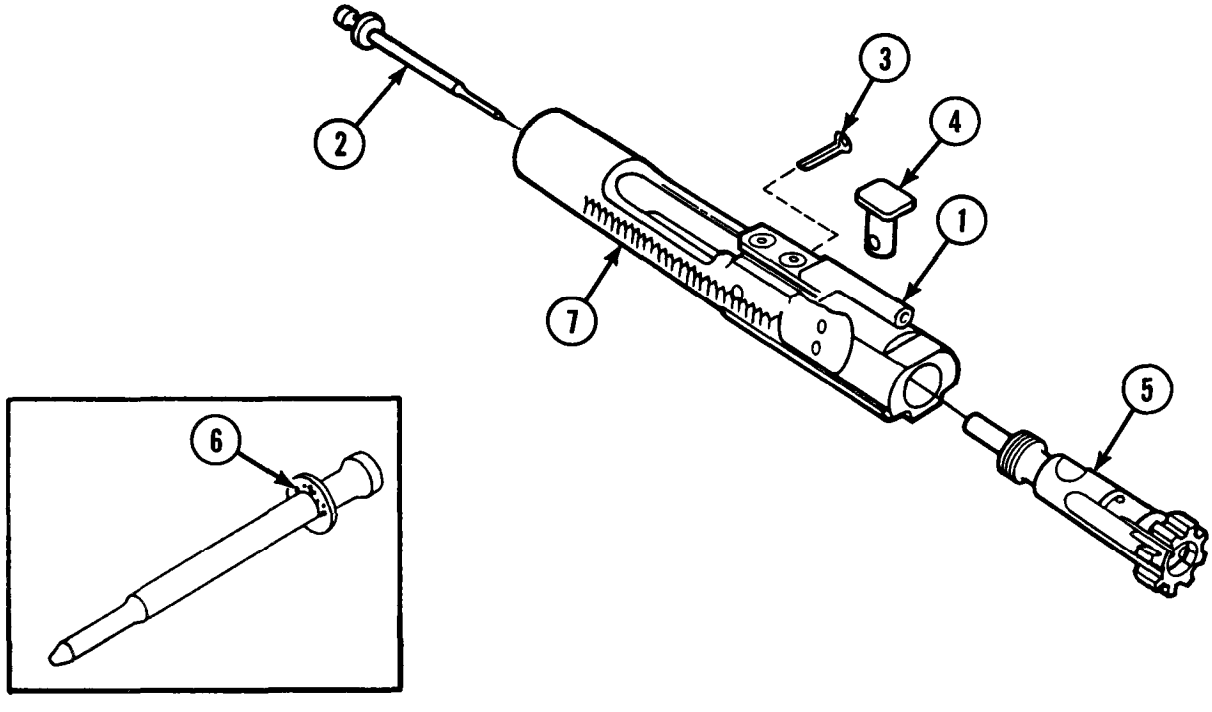
b. CLEANING

Clean all items (operator's manual). Remove carbon deposits using CLP or RBC.

c. INSPECTION/REPAIR

1

(a) Inspect carrier key (1) for dents, distortion or looseness. If dented, straighten (see step 2 on next page). If loose, evacuate to direct support maintenance.



(b) Inspect firing Pin (2), retaining pin (3), and cam pin (4) for cracks, mutilation, or excessive wear. Replace if unserviceable.

(c) Inspect bolt assembly (5) for damage or excessive wear. See page 2-30 for repair procedures.

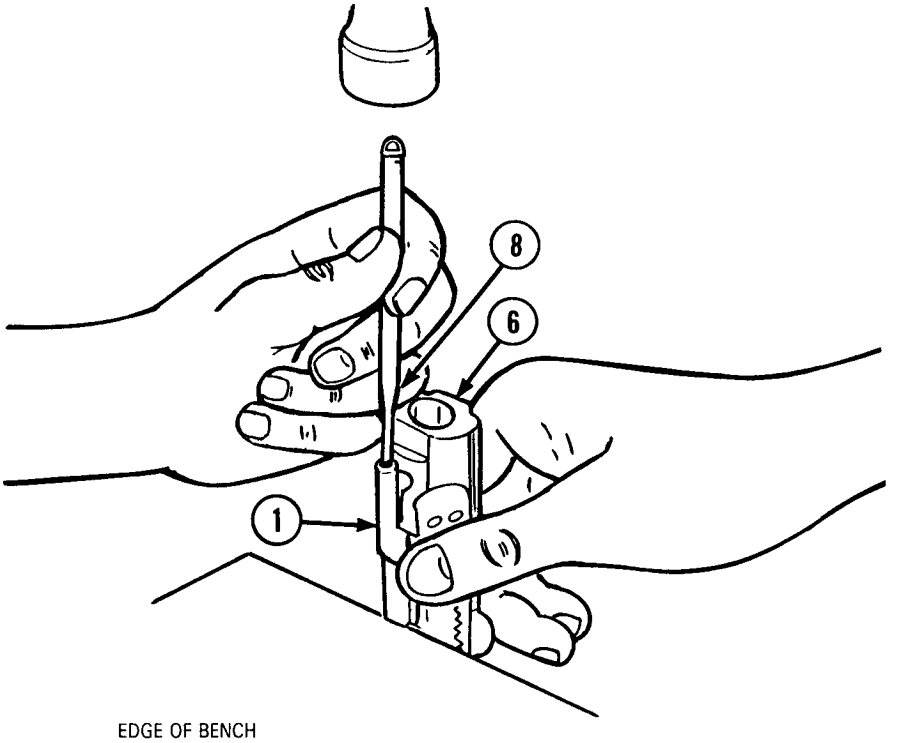
(d) Inspect firing pin (2) for breaks or if tip is mutilated. Evacuate to direct support maintenance if unserviceable. Pits or wear in area illustrated (6) is permissible.

(e) Inspect key and bolt carrier assembly (7) for damage or wear. If unserviceable, evacuate to direct support maintenance.

2-15. BOLT CARRIER ASSEMBLY (CONT).

c. INSPECTION/REPAIR (CONT)

2



CAUTION

Extreme care must be exercised during the following procedure to assure that the striking force is not directed to the attaching screws and that the tube portion is not enlarged or flared beyond original requirement. Such enlargement would permit loss of gas pressure when the key and gas tube come together during function/operation.

Straighten small dents and/or distortions in carrier key (1) using fabricated key tool (8) as follows:

(a) Place the key and bolt carrier assembly (6) in a vertical position, supported in a manner that contact is made with the rear surface of the carrier key (1).

(b) Insert the small end of the key tool (8) into the tube portion of the key.

(c) Strike the large end of the key tool (8) lightly with a 3-ounce, soft-brass hammer.

(d) Repeat striking (gently) until carrier key (1) is reformed to original configuration.

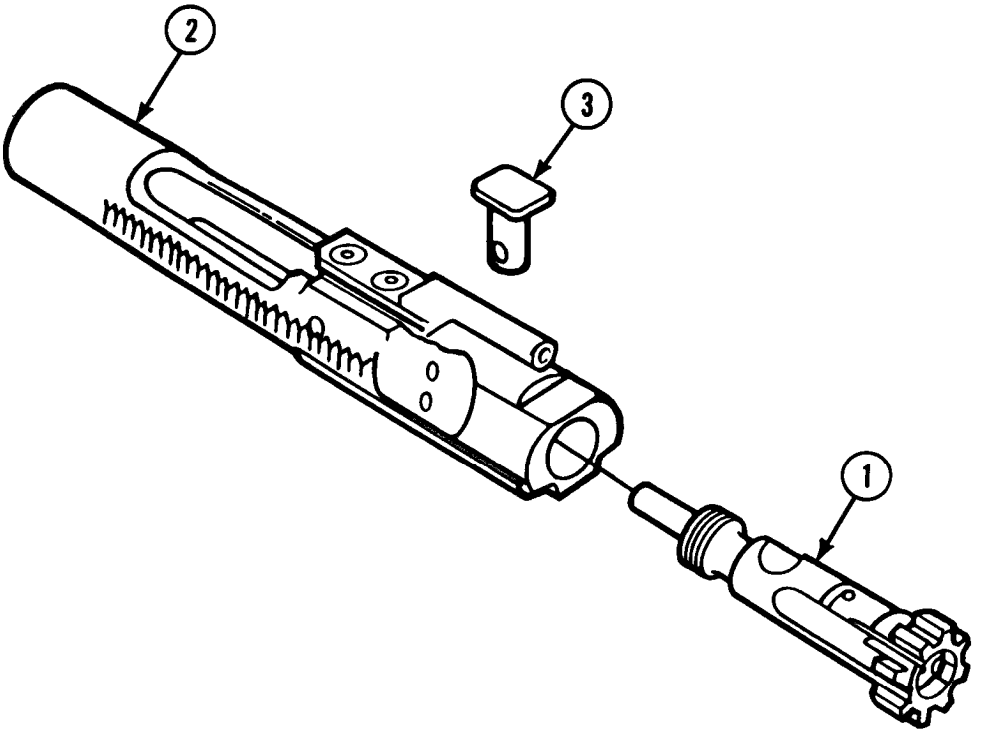
(e) If carrier key cannot be reformed to original configuration, evacuate to direct support maintenance.

d. LUBRICATION

Lubricate all items using CLP, LSA or LAW (p 2-22) or (operator's manual).

e. REASSEMBLY

1



WARNING

Do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.

Bolt cam pin must be installed or weapon will blow up while firing the first round. If the cam pin is not installed, injury to, or death of, personnel may result.

NOTE

Before installing bolt assembly, check to see that the ring gaps are staggered to prevent loss of gas pressure.

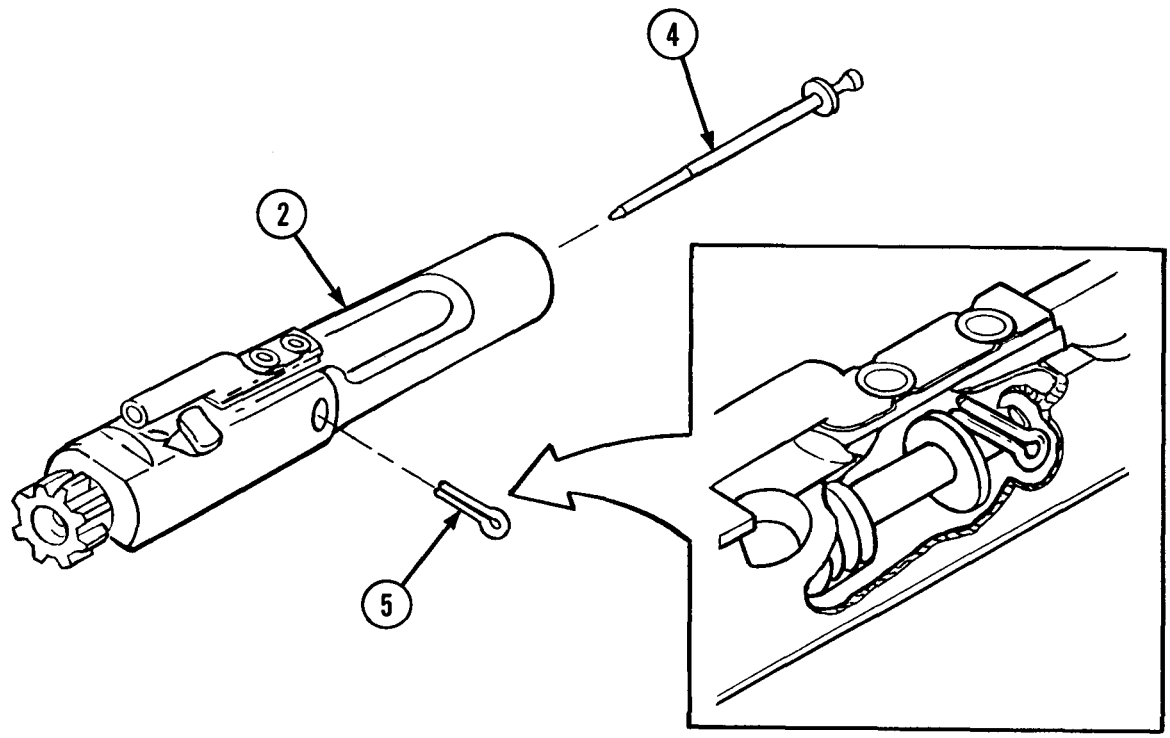
(a) Install bolt assembly (1) in key and bolt carrier assembly (2).

(b) Install bolt cam pin (3) and rotate one quarter turn to secure bolt assembly (1).

2-15. BOLT CARRIER ASSEMBLY (CONT).

e. REASSEMBLY (CONT)

2



NOTE

Firing pin retaining pin must be installed from the left side only.

(a) Hold key and bolt carrier assembly (2) in vertical position and drop firing pin in position.

(b) Install firing pin retaining pin (5) from left side only. Check proper installation by attempting to shake out firing pin.

2-16. BOLT ASSEMBLY.

This task covers:

a. Disassembly
b. Cleaning
c. Inspection/Repair
d. Lubrication
e. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Tools
Small Arms Repairman Tool Kit.
SC 5180-95-CL-A07 (19204)

Materials/parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Cleaning compound, rifle bore (RBC) (item 11, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)

Reference
TM 9-1005-249-10 (Operator's manual)

Equipment Condition
Bolt carrier assembly removed

General Safety Instructions
Do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

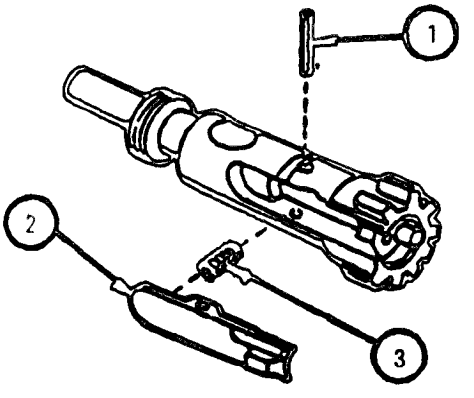
a. DISASSEMBLY

1

NOTE

Do not separate cartridge extractor and extractor spring assembly unless replacement of either or both is required.

Do not remove the insert from the extractor spring assembly.



(a) Push out extractor pin (1) using a 3/32 punch and remove cartridge extractor (2) and extractor spring assembly (3) as a unit.

NOTE

There are two types of extractor springs. The earlier design does not contain an insert. The latest design contains an insert. All old type extractor springs must be replaced.

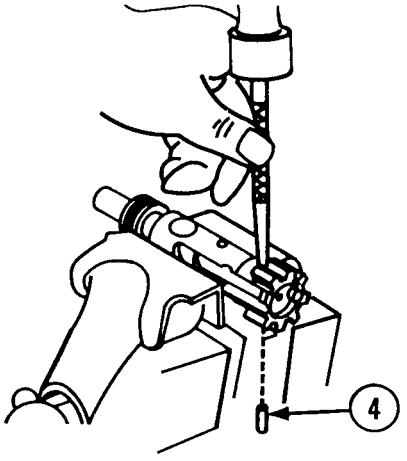
Do not remove extractor spring assembly from cartridge extractor unless either part requires replacement.

(b) If required, twist extractor spring assembly (3) counter-clockwise while gently pulling on it, to remove from cartridge extractor (2). Do not remove/lose rubber insert from spring assembly.

2-16. BOLT ASSEMBLY (CONT)

a. DISASSEMBLY (CONT)

2



CAUTION

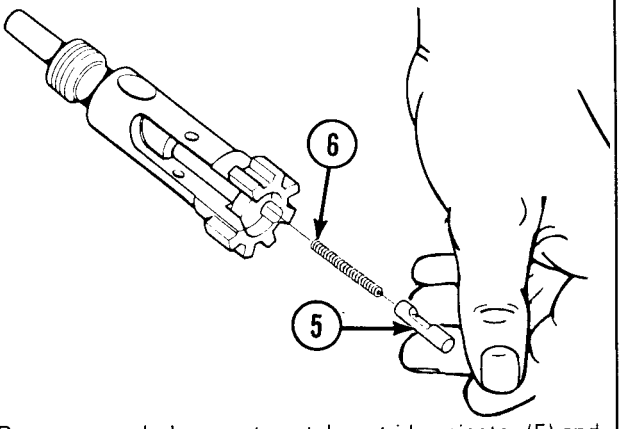
Be sure to use vise jaw protective caps.

Hold bolt body in vise and remove spring pin (4) using punch and hammer.

3

WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.



Remove punch, be sure to catch cartridge ejector (5) and ejector spring (6) to prevent loss.

b. CLEANING

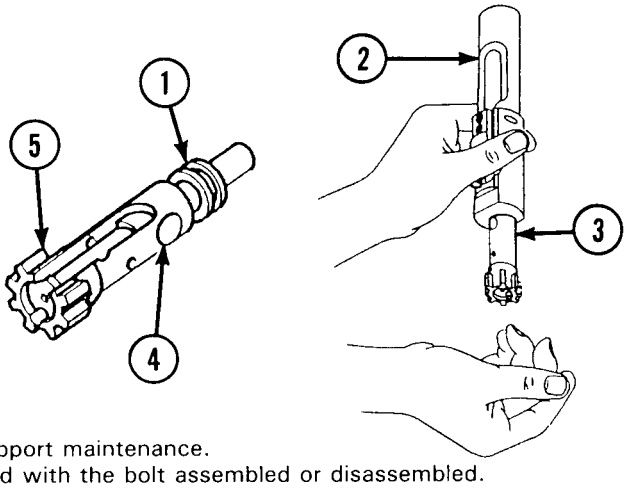
CAUTION

Do not distort extractor pin or spring assembly during cleaning.

Clean all items (operator's manual). Remove carbon deposits with CLP or RBC.

c. INSPECTION/REPAIR

1. Check bolt rings (1) for proper spacing, (approximately 1/3 apart).
2. With retaining pin and cam pin removed from bolt carrier assembly (2), check for worn bolt rings (1) as follows: Insert bolt assembly (3) all the way in bolt carrier. Turn bolt carrier downward as illustrated. If bolt assembly falls out, rings are worn. Evacuate to direct support maintenance.
3. Inspect for cracks, especially around cam pin hole (4), and locking lugs (5).
4. Inspect extractor, extractor spring assembly, and extractor pin for cracks, breaks, chips, and other damage. Pay close attention to extractor lip.
5. Inspect ejector and ejector spring for cracks, breaks, and chips.
6. Replace all authorized unserviceable items.
7. Repairs not authorized at this level, evacuate to direct support maintenance.
8. The inspection of the worn bolt rings can be accomplished with the bolt assembled or disassembled.



d. LUBRICATION

Lubricate all items with a light coat of CLP, LSA, or LAW (p 2-22).

e. REASSEMBLY

1

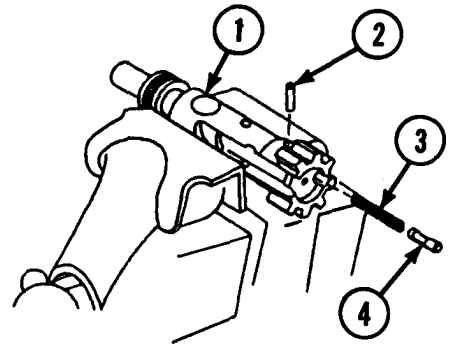
WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

Do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.

CAUTION

Be sure to use vise jaw protective caps.

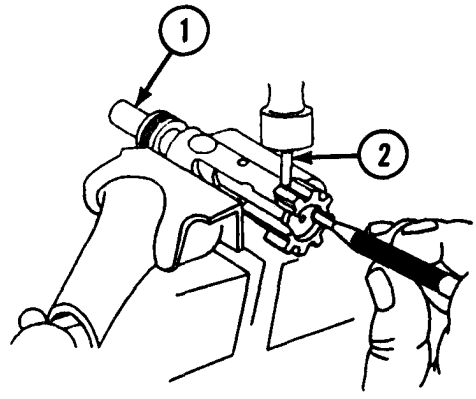


(a) Hold bolt body (1) in a vise and start spring pin (2) in hole.

(b) Install ejector spring (3) and cartridge ejector (4).

(c) Align groove on cartridge ejector (4) so that spring pin (2) can be installed.

2



(a) Compress and hold ejector spring and cartridge ejector in place with a 3/8 inch punch. Install spring pin (2) using a hammer.

(b) Complete installation of spring pin (2) so that the ends are flush with the outside of the bolt body (1).

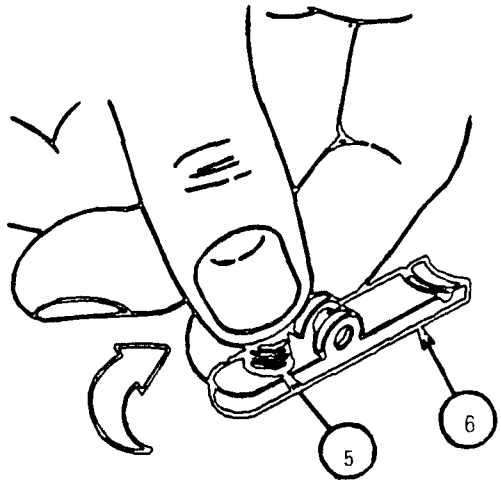
2-16. BOLT ASSEMBLY (CONT).

e. REASSEMBLY (CONT)

3

NOTE

There are two types of extractor springs. The earlier design does not contain an insert. The latest design (with an insert) is the only authorized repair part. All old type extractor springs must be replaced.



NOTE

Do not disassemble rubber insert from spring assembly.

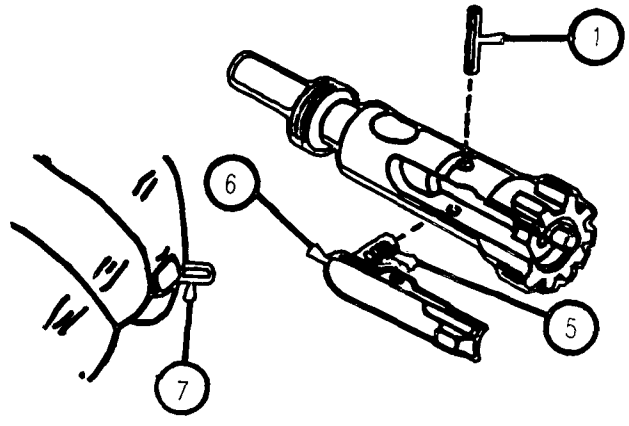
If extractor spring was removed, insert large end of extractor spring assembly (5) into cartridge extractor (6) and seat by pushing and turning clockwise, until it is seated.

4

(a) Position cartidge extractor (6) and extractor spring assembly (5) on bolt body (1).

(b) Compress spring assembly (5) and cartridge extractor (6) to align holes.

(c) Install extractor pin (7) by hand.



2-17. CHARGING HANDLE ASSEMBLY.

This task covers;

a. Disassembly
b. Cleaning
c. Inspection/Repair
d. Lubrication
e. Reassembly

INITIAL SETUP

Application Configuration
M16/M16A1 Rifle

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)

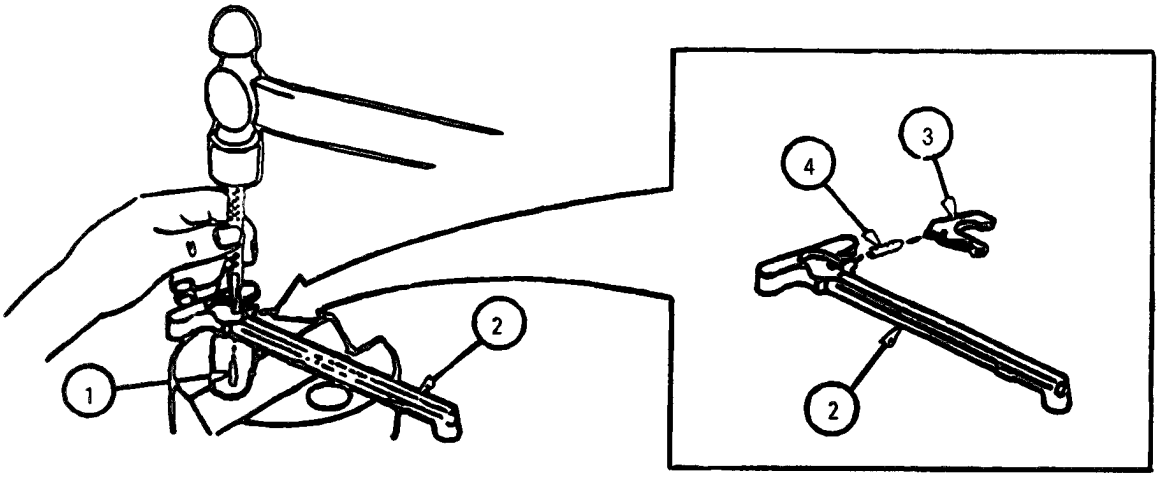
References
TM 9-1005-249-10 (operator's manual)

Equipment Condition
Charging handle removed

a. DISASSEMBLY

WARNING

To avoid injury to eyes, use care when removing and installing spring-loaded parts.



1. Remove spring pin (1) from charging handle (2) using a hammer and 1/16 inch punch.
2. As punch is withdrawn, catch charging handle latch (3) and helical spring (4) to prevent loss.

2-17. CHARGING HANDLE ASSEMBLY (CONT).

b. CLEANING

Clean all items (operator's manual).

c. INSPECTION/REPAIR

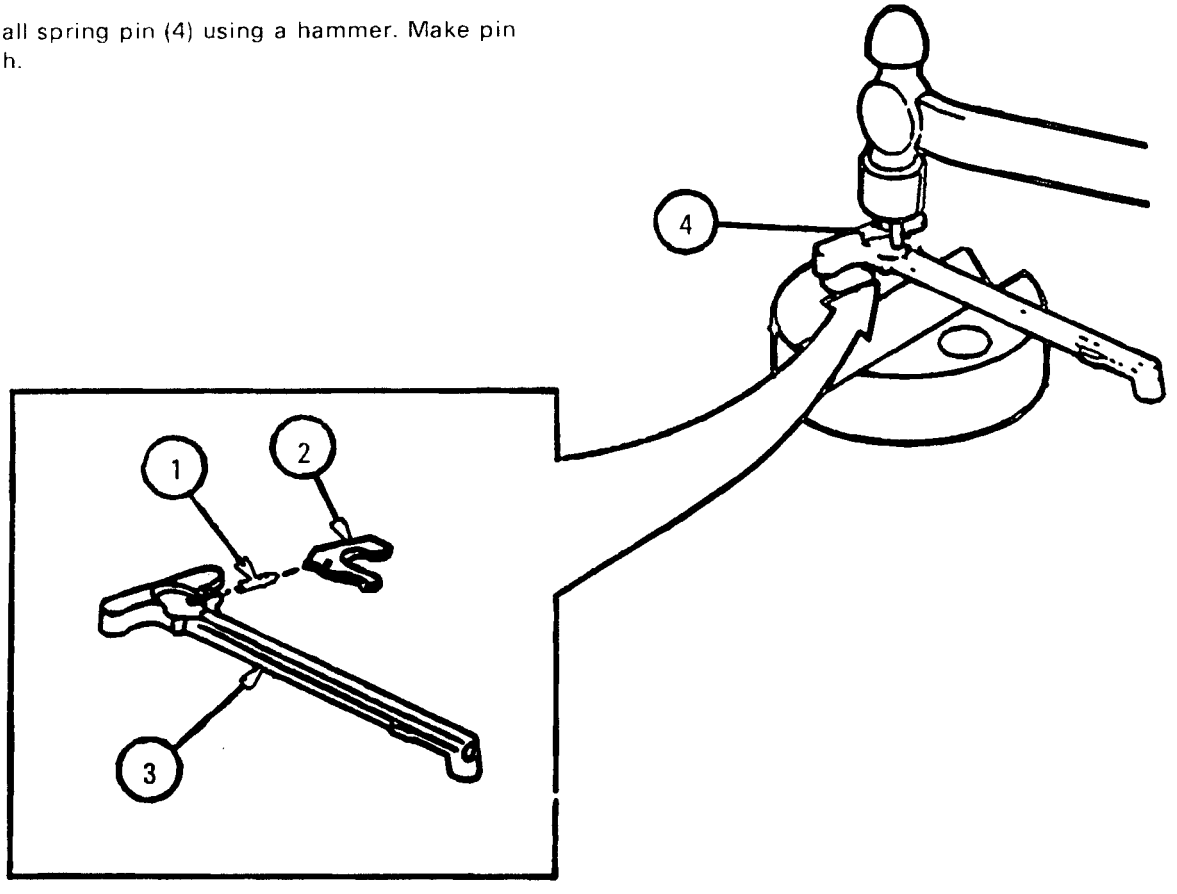
Inspect all items for breaks, cracks, or mutilation. Replace all authorized unserviceable items.

d. LUBRICATION

Lubricate all items, with a light coat of CLP, LSA, or LAW (p 2-22) (operator's manual).

e. REASSEMBLY

1. Position helical spring (1) and charging handle latch (2) in charging handle (3). Align holes and hold in position.
2. Install spring pin (4) using a hammer. Make pin flush.



2-18. UPPER RECEIVER AND BARREL ASSEMBLY (HANDGUARD ASSEMBLY).

This task covers:

a. Disassembly
b. Inspection/Repair
c. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Equipment Condition
Weapon assembled.

Reference
TM 9-1005-249-10 (operator's manual)

a. DISASSEMBLY

1

CAUTION

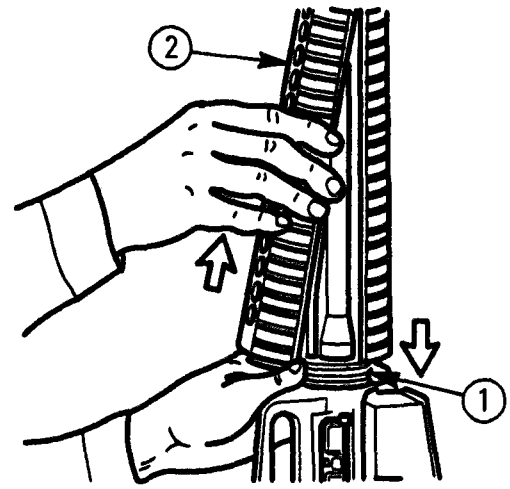
Do not use a screwdriver or any other tool when removing the handguards. Doing so may damage the handguard and/or slip ring.

Do not remove heat shields from handguards. Doing so will damage the heatshield and the handguard will have to be replaced.

NOTE

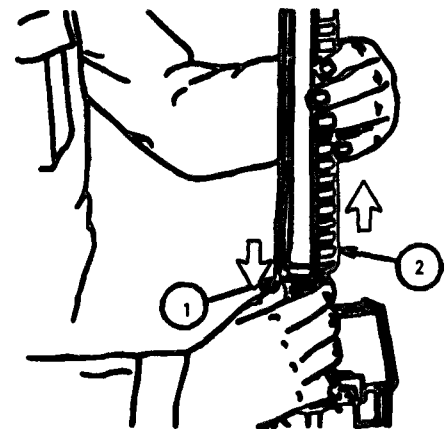
Refer to operator's manual for "buddy system" procedure on removing handguards.

Push down on handguard slip ring (1) and lift the handguard (2) up and out.



2

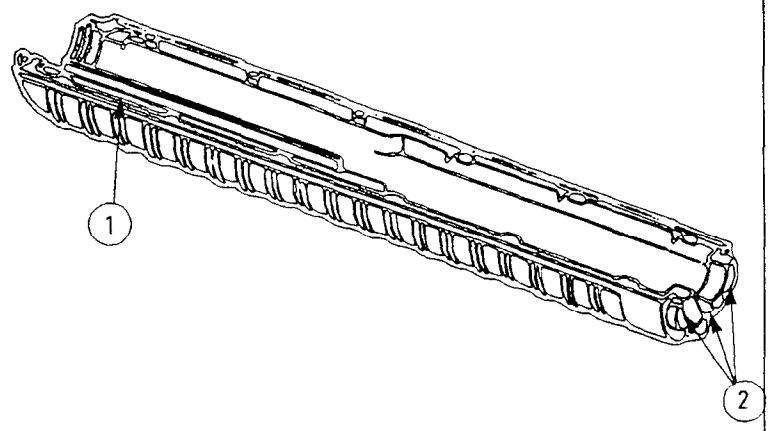
Push down on handguard slip ring (1) and lift the other handguard (2) up and out.



2-18. UPPER RECEIVER AND BARREL ASSEMBLY (HANDGUARD ASSEMBLY) (CONT).

b. INSPECTION/REPAIR

1. Inspect handguard assembly for breaks, separations, and cracks.
2. Breaks and separations of material which prevent proper retention or interfere with functioning of the weapon will be cause for handguard rejection and replacement.
3. Cracks up to one inch in length are acceptable provided they do not extend into the handguard retaining flange (1) (critical area).
4. Each handguard assembly may have up to two of the three front retaining tabs (2) missing. If all three front tabs are missing, the handguard assembly must be replaced.



5. Replace severely cracked handguards. Handguards that have a heatshield loose enough to rattle when installed on the rifle must be replaced.

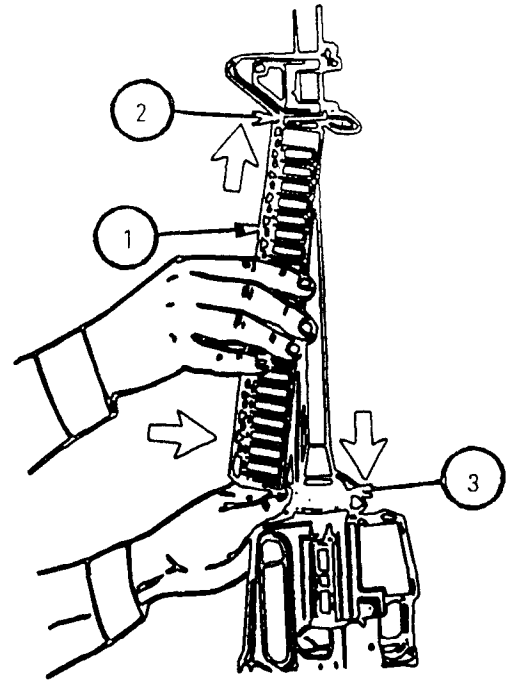
c. REASSEMBLY

1

NOTE

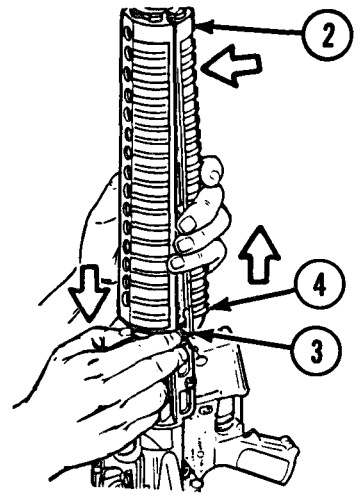
Refer to operator's manual for "buddy system" procedure on installing handguards.

Install top of handguard (1) in tube cap (2) while pushing down on handguard slip ring (3). Push bottom of handguard (1) in place and release handguard slip ring (3) to lock handguard in place.



2

Install top of the other handguard (4) in handguard cap (2) while pushing down on handguard slip ring (3). Push bottom of handguard (4) in place and release handguard slip ring (3) to lock both handguards in place.



2-19. UPPER RECEIVER AND BARREL ASSEMBLY.

This task covers:

a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Lubrication
f. Reassembly
g. Mechanical Zero Procedures (A.F. only)

INITIAL SETUP

Application Configuration
M16/M16A1 Rifle

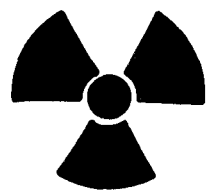
Tools
Front sight post and low light level front sight post removal/installation tool (fig E-1, app E)
Small Arms Repairman Tool Kit SC 5180-95-CL-A07 (19204)

Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Cleaning compound, rifle bore (RBC) (item 11, app D)
Lubricating oil, weapons LAW (item 20, app D)
Lubricating oil, weapons LSA (item 21, app D)

Reference
TM 9-1005-249-10 (operator's manual)

Equipment condition
Handguards removed.
Upper receiver and barrel assembly removed from lower receiver.

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.
When using solid film lubricant or dichloromethane, be sure the area is well ventilated.

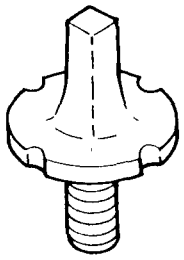


Barrel assembly may be equipped with a low light level sight. The low light level sight contains radioactive material. If so equipped, do not insert metal objects into the post slot or otherwise treat roughly to cause breakage of the radioactive element.

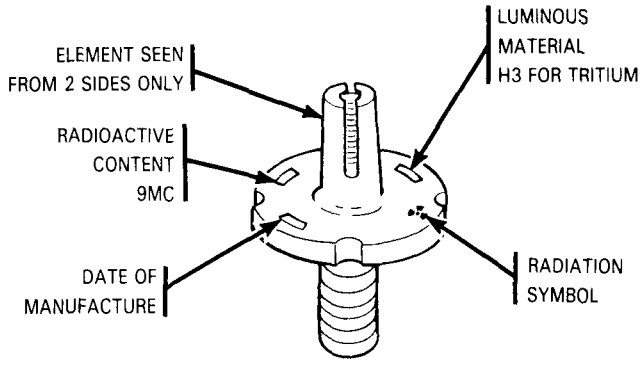
2-19. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

a. DISASSEMBLY

1



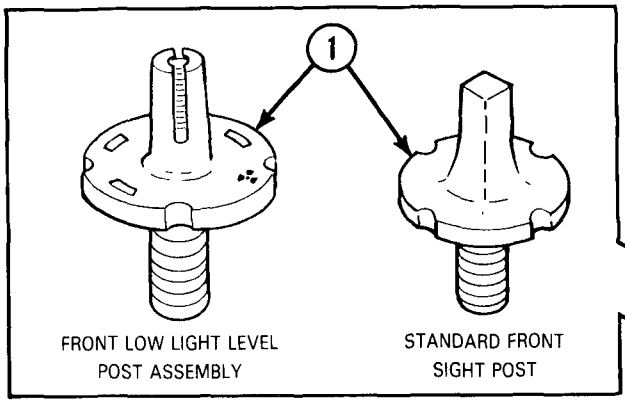
STANDARD FRONT SIGHT POST



FRONT LOW LIGHT LEVEL POST ASSEMBLY

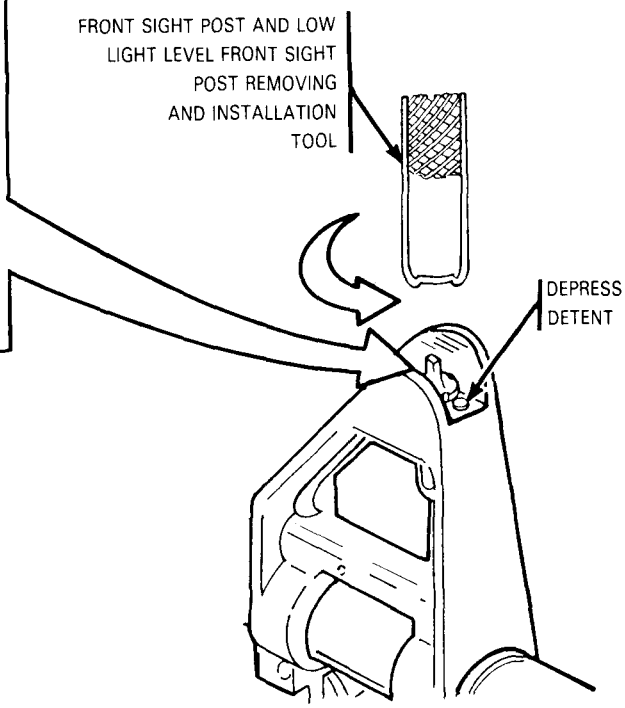
Prior to disassembly, inspect upper receiver and barrel assembly to determine type of front sight installed, standard or low light level. If a radioactive low light level sight is installed and if it has been damaged, see warning page and Chapter 2, Section V.

2

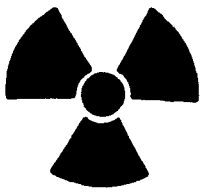


FRONT LOW LIGHT LEVEL POST ASSEMBLY

STANDARD FRONT SIGHT POST



WARNING

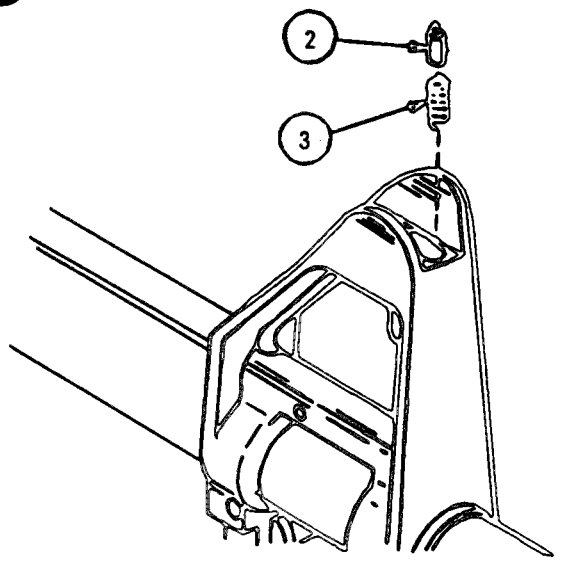


If weapon is equipped with low light level front post assembly, see page 4-2 for usable life and maintenance.

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

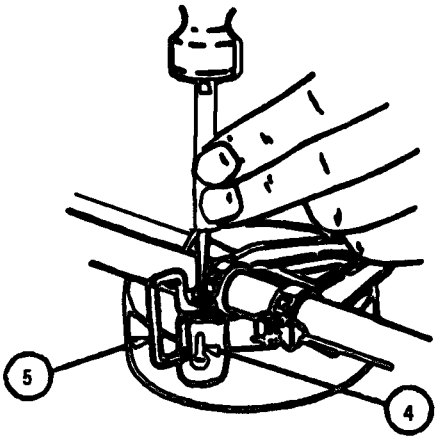
Remove front sight post (1) using appropriate end of fabricated tool.

3



Catch front sight detent (2) and helical spring (3) to prevent loss.

4

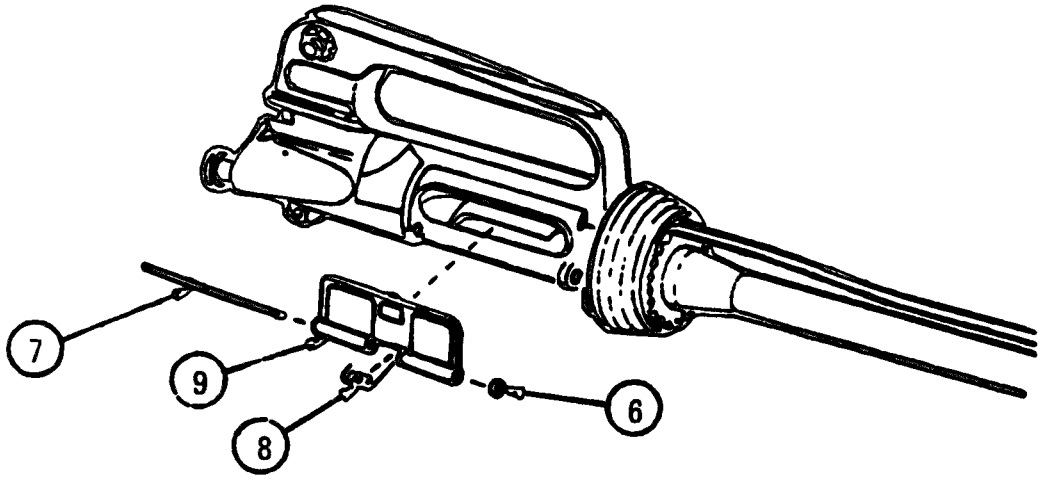


NOTE

Disassemble swivel only if repair is necessary.

If necessary, knock out rivet (4) with a hammer and punch and remove swivel (5). Discard rivet (4).

5



NOTE

Do not disassemble further unless repair is necessary. Ejection port cover pin (7) may bind against the forward assist housing on the M16A1 rifle and require some additional force to remove.

(a) Using two flat tip screwdrivers, remove retaining ring (6) and slide ejection port cover pin (7) out to the rear.

(b) Catch helical spring (8) and ejection port cover (9) to prevent loss.

2-19. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

b. CLEANING

Clean all items with CLP or RBC (operator's manual).

c. INSPECTION

1

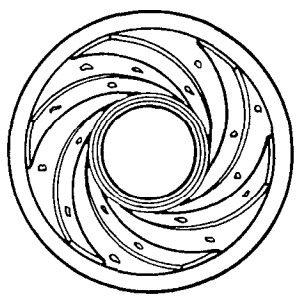
(a) Inspect front sight base for chips, breaks and cracks. If damaged, evacuate to support maintenance.

(b) Inspect low light level sight (if installed) for broken sights and loss of illumination.

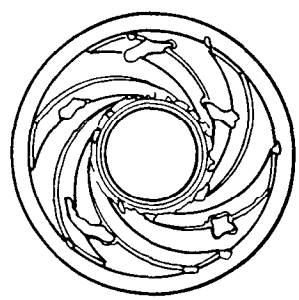
(c) Inspect all parts for serviceability.

2

(a) Inspect barrel for pits, dirt and rust in bore, burrs, broken or worn locking lugs, and surface cracks and defects.



ACCEPTABLE



NOT ACCEPTABLE

(1) Pits no wider than a land or groove and 3/8 inch or less in length are allowable in the bore.

(2) Lands that appear dark due to coating of gilding metal from projectiles are allowable.

(3) Stripping of lands and grooves shall not be cause for rejection unless so determined by barrel erosion gage.

(b) Inspect chamber for pitting. Fine pits, or fine pits in a densely pitted area, are allowable. Pits 1/8 inch in length are cause for rejection.

(c) Inspect bore for ringing. Definitely ringed bores or bores ringed sufficiently to bulge the outside surface of the barrel are causes for rejection.

(d) If the barrel is rejected in accordance with the above criteria, evacuate to support maintenance.

d. REPAIR

For touch up of M16/M16A1 Rifle, see page 2-22.

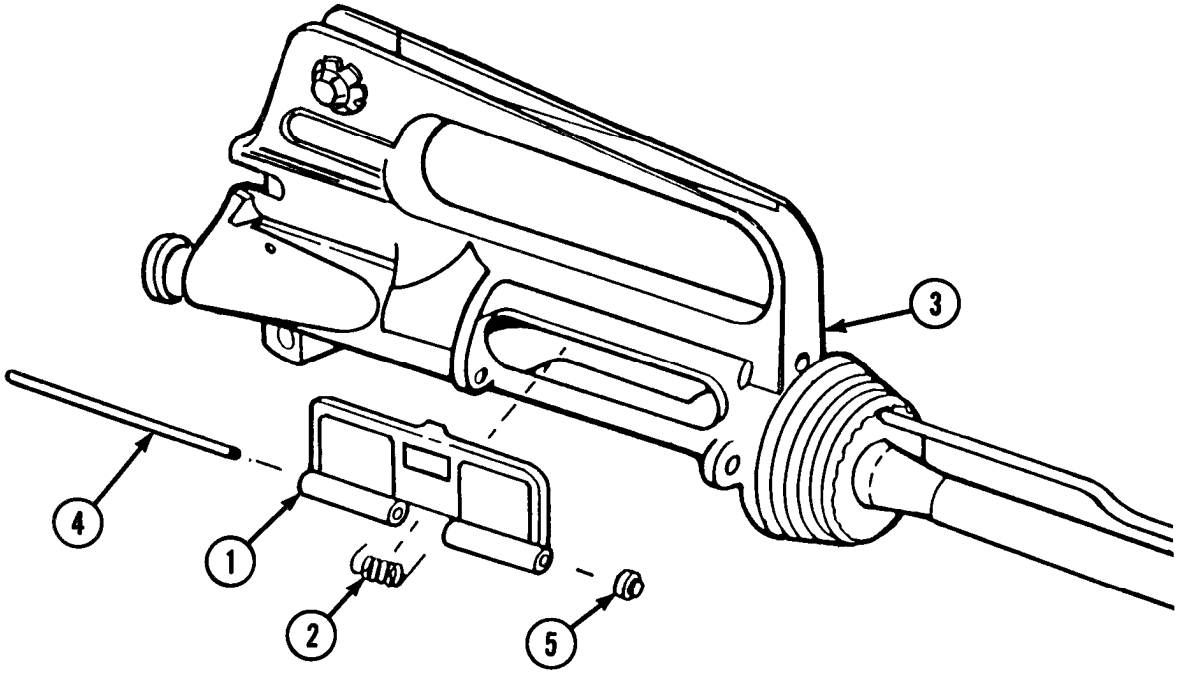
Replace all authorized unserviceable parts. If repair is not authorized at this level, evacuate to direct support maintenance.

e. LUBRICATION

Lubricate all items with a light coat of CLP, LSA, or LAW (p 2-22) or operator's manual.

f. REASSEMBLY

1



(a) If previously disassembled, position cover (1) and spring (2) on upper receiver (3) with short leg of spring to the rear pointing up toward top of receiver.

NOTE

Legs of spring must be positioned and pretensioned before the pin is installed.

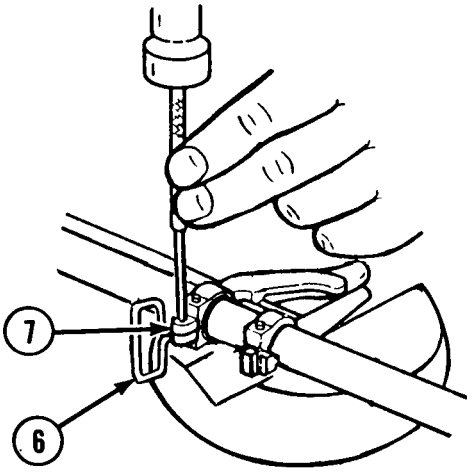
(b) Hold spring (2) short leg in this position and turn long leg 1/2 turn clockwise (as viewed from front of receiver (3)) to increase spring tension.

(c) Position long leg of spring (2) to be on inside of cover (1) when it is closed. Hold spring and cover in this position and install pin (4) and retaining ring (5).

2-19. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

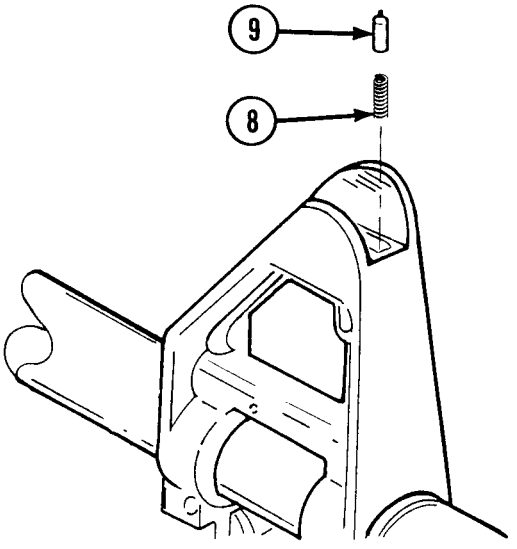
f. REASSEMBLY (CONT)

2



If previously disassembled, position sling swivel (6) and install new tubular rivet (7) using center punch and hammer to spread and flare the hollow head of the tubular rivet.

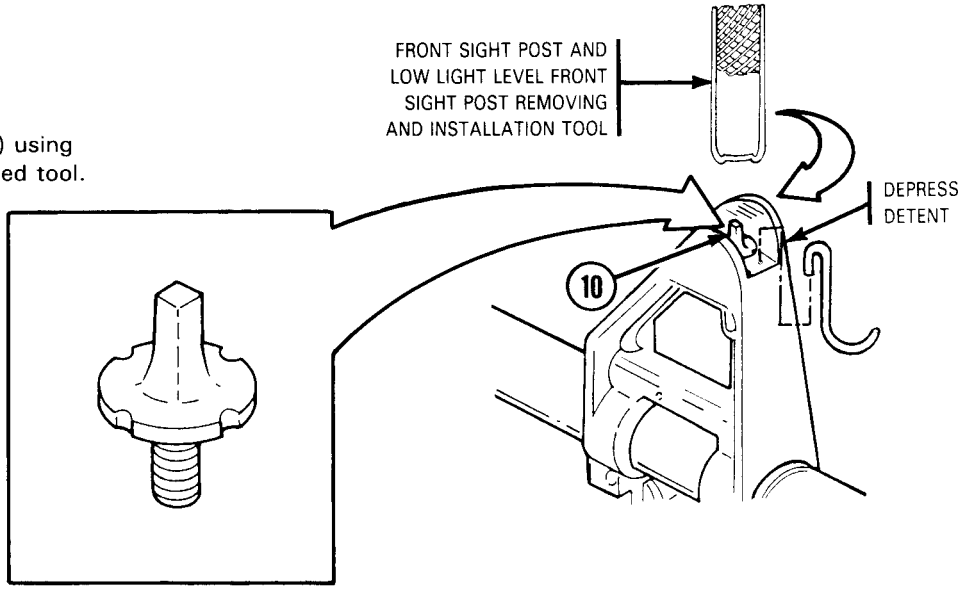
3



Install helical spring (8). Position and depress front sight detent (9) with punch.

4

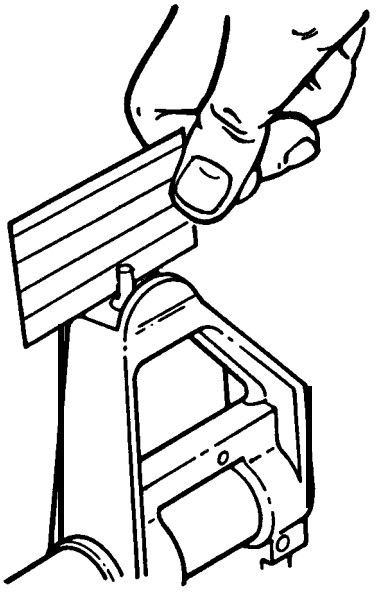
Install front sight post (10) using appropriate end of fabricated tool.



g. MECHANICAL ZERO PROCEDURES

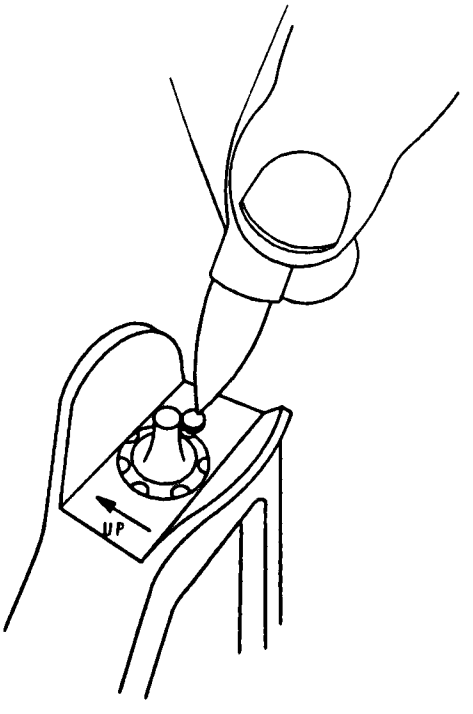
1

Mark a piece of plastic card stock or rigid paper with lines from 1 to 5mm in 1 mm increments. Set the card on the front sight frame and check the height of the top of the front sight post.



2

Adjust the front sight so the top of the front sight post is 5mm above the machined surfaces of the front sight frame.

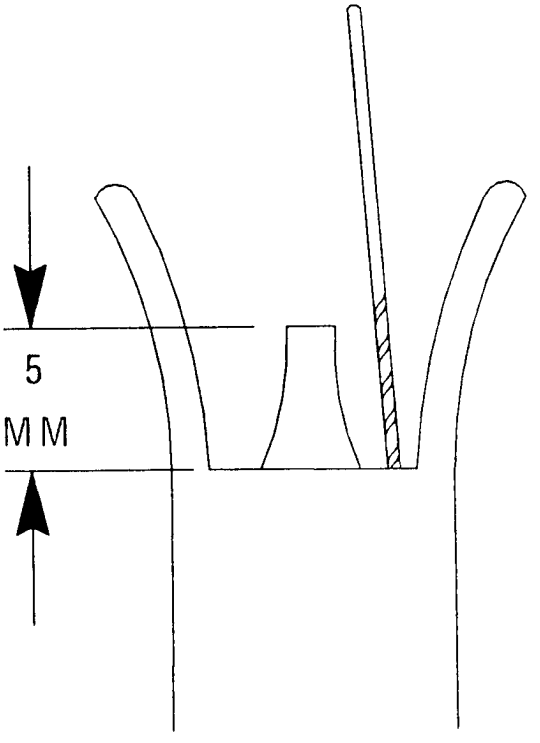


2-19. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

g. MECHANICAL ZERO PROCEDURES (CONT)

3

Visually check the front sight post top height by using the marked plastic or paper card. Card must set level on the machined surfaces of the front sight frame to obtain an accurate reading.



NOTE: Procedure will give an approximate battle sight zero to most M16 rifles. Once the above steps are completed, the rifle will be mechanically zeroed for 250 meters using the unmarked or short-range aperture and at 375 meters using the "L" or long-range aperture. The above steps can also be used before firing a new or newly assigned rifle. Use the procedure to check rifles stored in preferred packaging during routine inspections. This will help ensure people armed with the rifles will stand a better chance of hitting an enemy if the rifles must be used before a live fire zero can be made. Whenever possible, zeroing of the rifle should be accomplished using ball ammunition on a 25 meter zeroing target using the "L" aperture.

2-20. LOWER RECEIVER AND EXTENSION ASSEMBLY.

This tasks covers:

a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Lubrication
f. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)
Pivot Pin Removing Tool (fig E-2, app E)
Pivot Pin Installation Tool (fig E-5, app E)

Materials/parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Lubricant, solid film (SLF) (item 19, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)
Screw, Self-Locking (Butt-Cap Screw) (item 28, pg C-10)

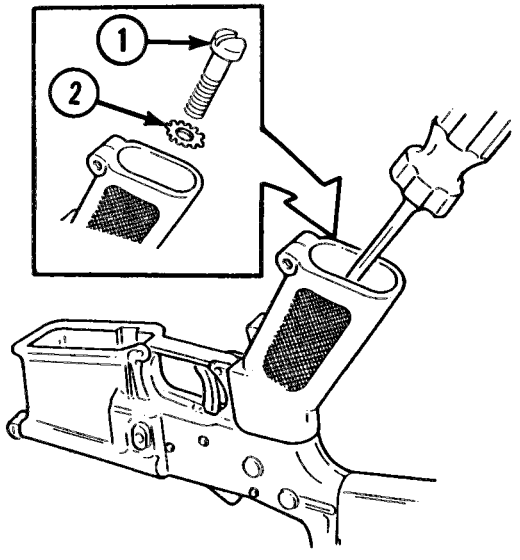
Reference
TM 9-1005-249-10 (operator's manual)

Equipment Condition
Lower receiver and extension assembly removed.

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

a. DISASSEMBLY

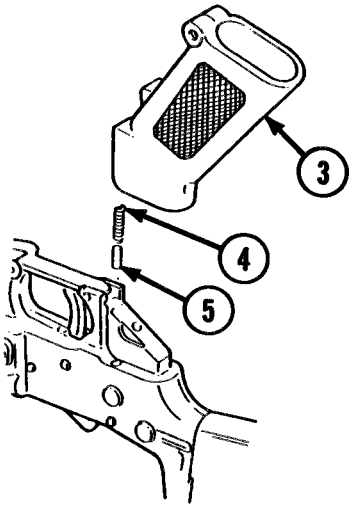
1



Using flat tip screwdriver, reach inside rifle grip and remove screw (1) and lock washer (2).

2

WARNING
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.



Carefully remove rifle grip (3) and catch helical spring (4) and safety detent (5) to prevent loss.

2-20. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT).

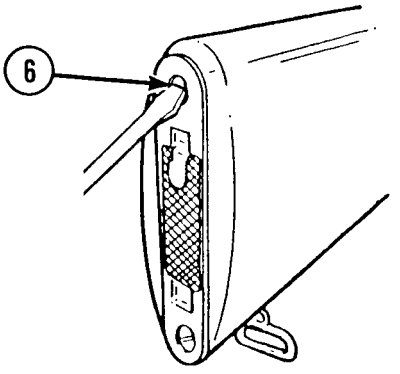
a. DISASSEMBLY (CONT)

3

NOTE

The butt cap screw is a self-locking screw. Due to the critical nature of the parts concerned, if the butt cap screw is removed, it must be discarded and replaced with a new one.

Remove butt cap screw (6).

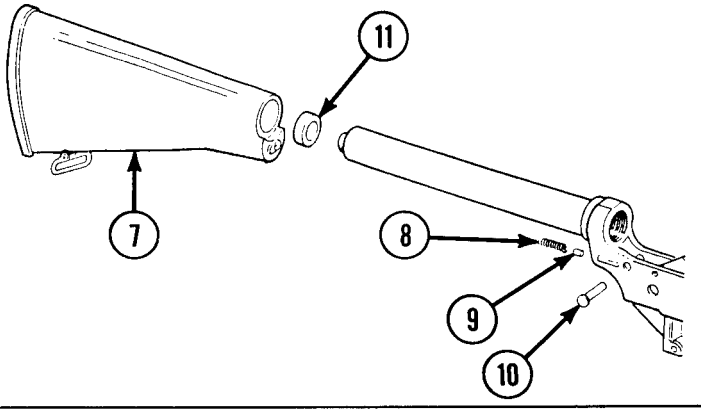


4

WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

Remove buttstock assembly (7) carefully and catch helical spring (8), detent (9), takedown pin (10), and stepped spacer (11) to prevent loss.



5

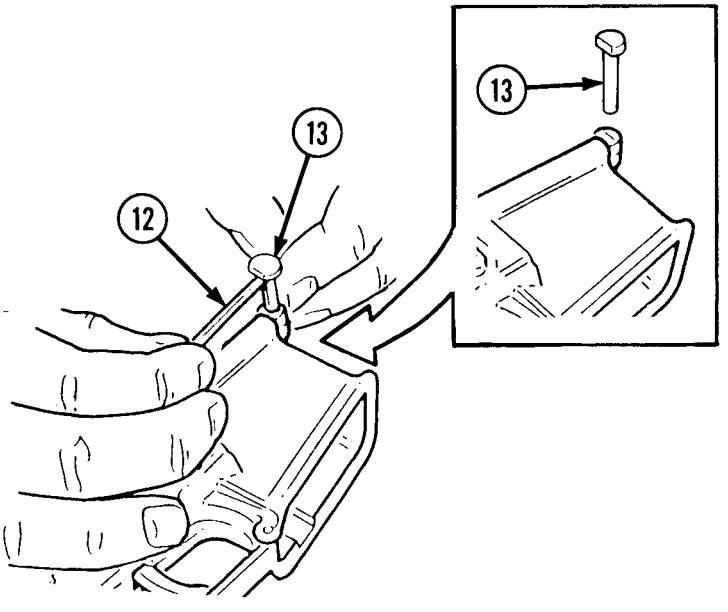
WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

Insert fabricated pivot pin removing tool (12) to compress detent. Turn pivot pin (13) a quarter-turn. Remove tool and pin.

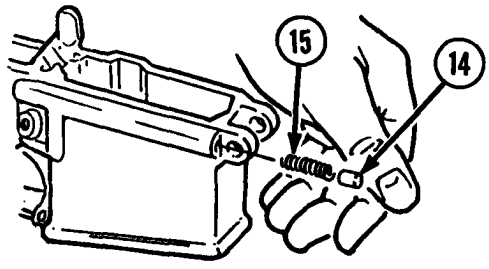
NOTE

Catch detent and spring as pivot pin is removed (see step 6 on next page).



6

Be sure to hold cupped hand in front of detent (14) and helical spring (15) to prevent loss of detent and spring.



7

WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

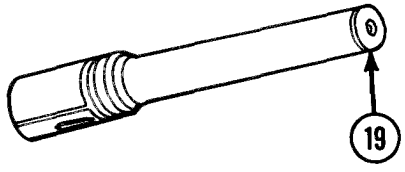
NOTE

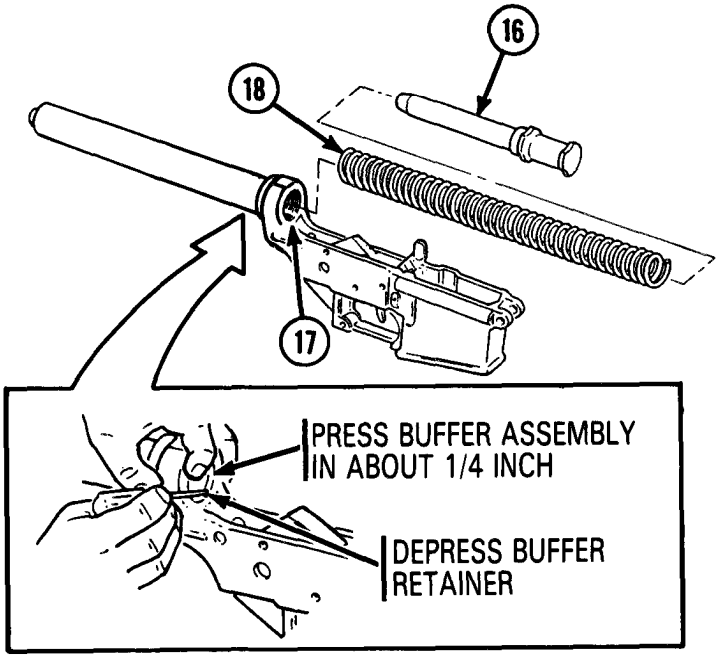
Make sure the hammer is cocked and the selector level is not set on AUTO before removing the buffer assembly.

Press buffer assembly (16) in. Using screwdriver, depress buffer retainer (17) and release buffer assembly (16) and action spring (18). Remove buffer assembly (16) and action spring (18) from receiver while depressing retainer (17).

NOTE

Early type buffer assembly (19) must be replaced.





b. CLEANING | Clean all items (operator's manual).

c. INSPECTION

1

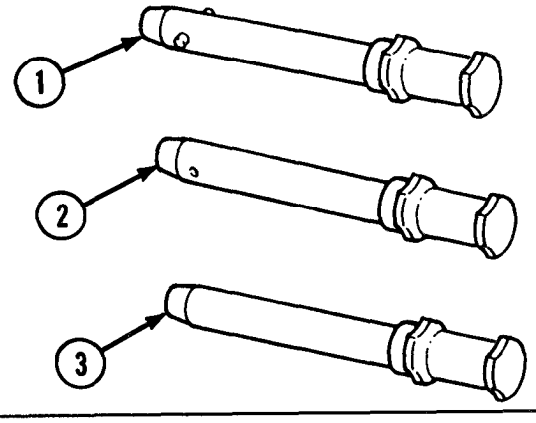
Inspect buffer assembly (1, 2, or 3) for cracks or damage.

(a) Some old buffers (1) have a hole with pin installed which protrudes equally on each side approximately 1/32 inch.

(b) Some buffers (2) have a hole in the housing but no pin.

(c) New buffers (3) do not have a hole in buffer body or a pin.

All configurations (1, 2, or 3) may be utilized. However, if cracked or damaged, replace.

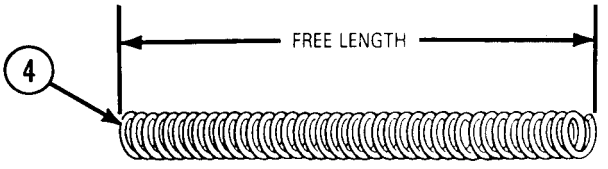


2-20. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT).

c. INSPECTION (CONT)

2

Check free length of action spring (4). The free length must be between 11 3/4 inches minimum and 13 1/2 inches maximum. Do not attempt to adjust spring length.



3

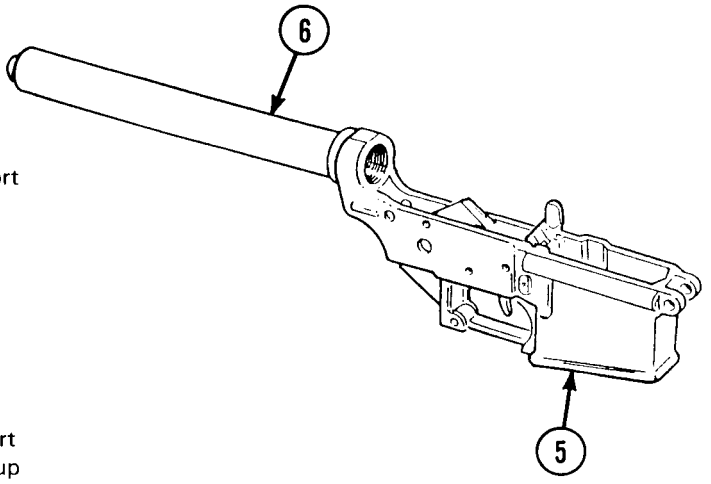
(a) Inspect lower receiver (5) (without further disassembly) for legibility of serial number. If the serial number is hard to read, notify direct support maintenance.

NOTE

Only direct support maintenance is authorized to restamp the serial number.

(b) Check lower receiver extension (6) for looseness and corrosion. If loose, evacuate to direct support maintenance. If corroded, clean area and touch up with solid film lubricant.

(c) Inspect for missing or damaged parts. Inspect finish of lower receiver for shiny spots. Touch up with solid film lubricant as required.



(d) Visually inspect all other parts for unserviceable or missing parts. Replace defective or missing parts.

d. REPAIR

For touch up of M16/M16A1 Rifle, use SFL (see p 2-22).

Replace all authorized unserviceable parts. If repair is not authorized at this level, evacuate to direct support maintenance.

e. LUBRICATION

Lubricate all metal components with a light coat of CLP, LSA, or LAW (p 2-22) (operator's manual).

f. REASSEMBLY

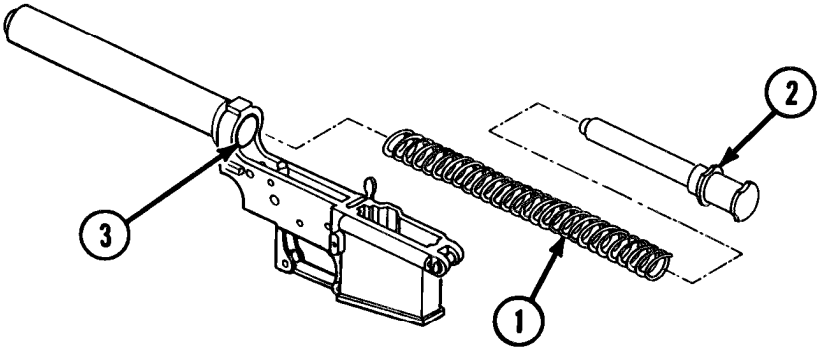
1

WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

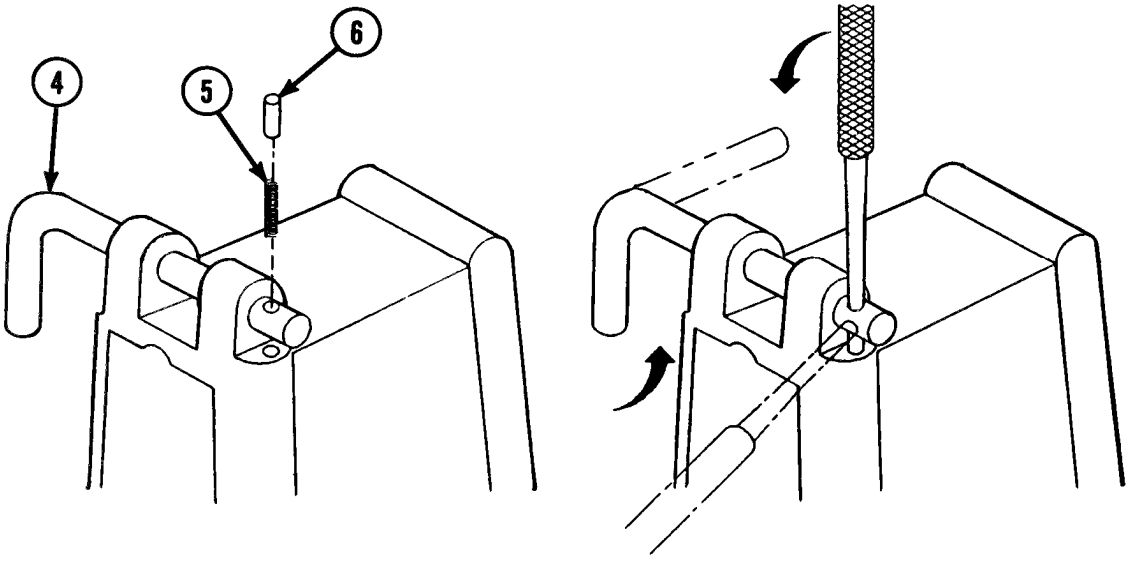
NOTE

Make sure the hammer is cocked and the selector level is not on AUTO before installing the buffer assembly.



Press action spring (1) and buffer assembly (2) in until retainer (3) snaps up and holds them in place.

2

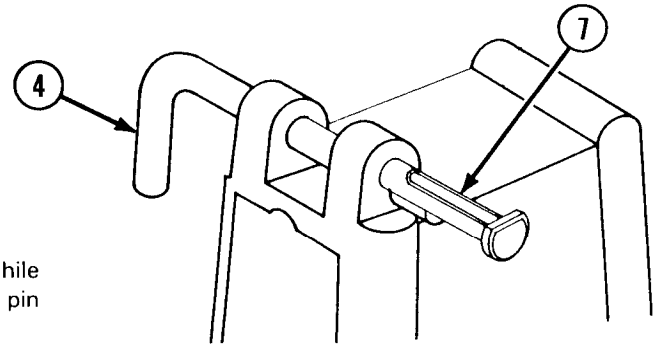


Install pivot pin installation tool (4). Insert helical spring (5) and detent (6). Compress detent in recess with punch and rotate tool.

2-20. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT)

f. REASSEMBLY (CONT)

3

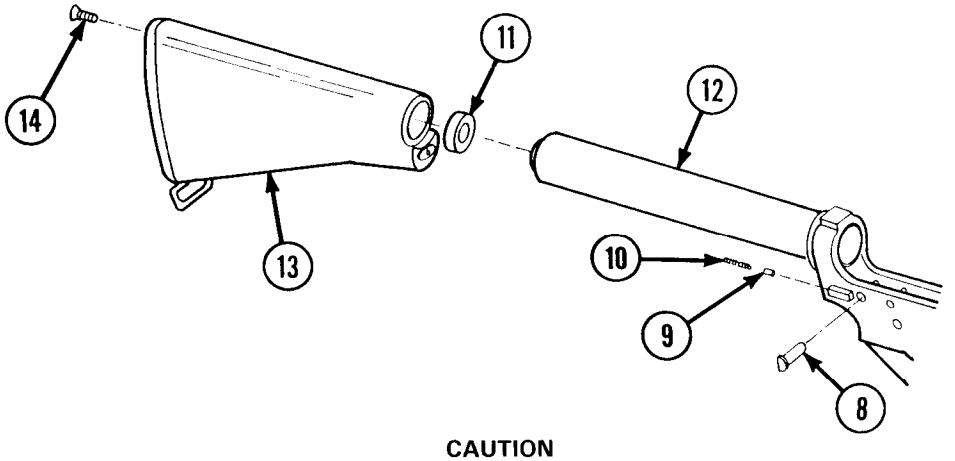


NOTE

Rounded end of detent must be in the groove of the pivot pin (7) when assembly is complete.

Position pivot pin (7) to keep detent depressed while removing fabricated pivot pin removing tool (6). Slide pin (7) into hole. Rotate pin and receive detent.

4



CAUTION

Do not kink the detent spring (10) during assembly.

NOTE

Pointed end of detent (9) must be in the groove of takedown pin (8) when assembly is complete.

(a) Install takedown pin (8) with groove toward the rear. Install detent (9) and spring (10) from the rear.

NOTE

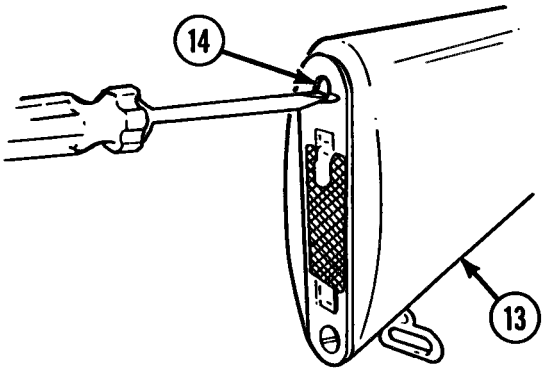
Stepped spacer (11) and butt-cap screw (14) PN 9349128 are required when using 10.103 inch long buttstock PN 9349121. When using old 9.478 in. long buttstock PN 8448651, stepped spacer (11) is not required but butt cap screw PN 8448627, NSN 1005-00-992-6657, is required.

(b) Install spacer (11) on receiver extension (12) and carefully slide buttstock assembly (13) on to compressed helical spring (10).

NOTE

Installing the buttstock assembly is easier if the lower receiver is held in a vertical position with the end of the lower extension pointed up.

5



NOTE

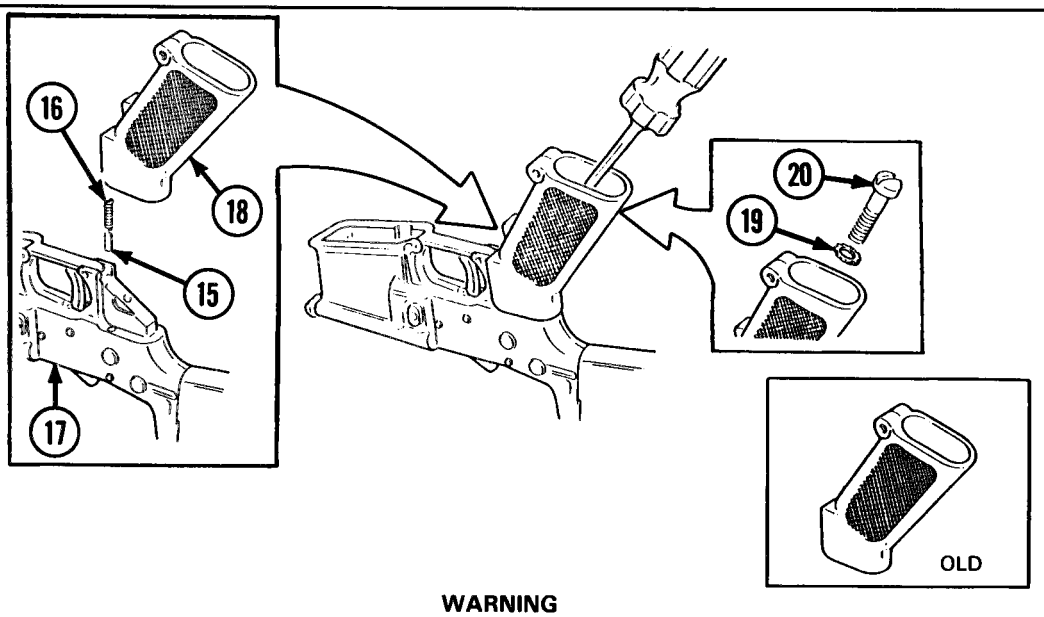
The butt cap screw (14) is a self-locking screw, and if removed, it must be discarded and replaced with a new one.

Secure buttstock assembly (13) in place with a new butt cap screw (14) as follows:

Tighten the screw until the tapered screw head has seated under normal pressure and resistance is felt.

Tighten screw an additional quarter turn. If butt cap screw continues to loosen under use, it should be replaced with a new one.

6



WARNING

When utilizing the enhanced rifle grip (it has a bump between the second and third finger for a better grip) PN 9349127, rifle grip screw, PN AN501D416-18 (1-1/8 in.) or AN501D416-16 (1 in.) are the authorized screws to be used with the enhanced grip. Any screw longer than 1-1/8 in. used with 9349127, could cause a hazardous situation. Also, ensure the washer is in place.

(a) Install detent (15), pointed end first, and spring (16) into bottom of lower receiver (17).

NOTE

A portion of the spring will fit in a hole in the rifle grip.

(b) Carefully install rifle grip (18) to compress spring (16). Secure grip (18) in place with lockwasher (19) and screw (20).

2-21. BUTTSTOCK ASSEMBLY.

This task covers:

a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Lubrication
f. Reassembly

INITIAL SETUP

Application Configuration
M16/M16A1 Rifle

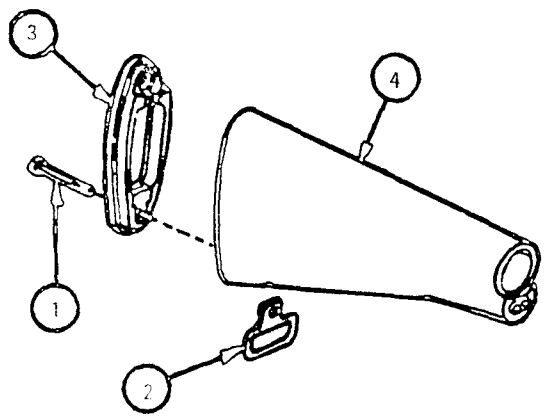
Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)

Equipment Condition
Lower receiver and extension assembly removed
buttstock assembly removed.

a. DISASSEMBLY

1

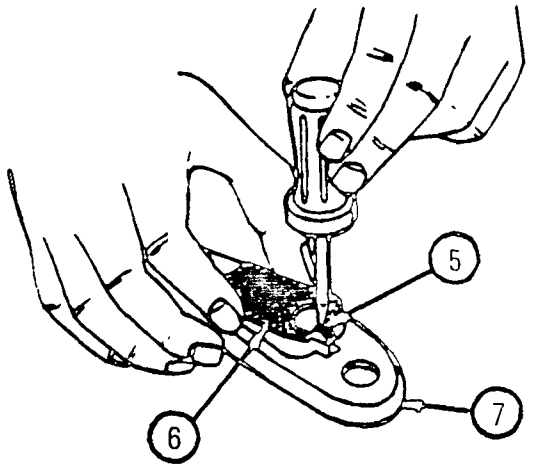


Using screwdriver, remove self-locking screw (1), rear sling swivel (2) and butt plate group (3) from buttstock (4).

NOTE

The buttstock assembly may utilize a buttstock (4) which is 10.103 inches long (PN 9349126) or 9.478 inches long (PN 8448654). See note on page 2-46 in reassembly for buttstock assembly part usage.

2

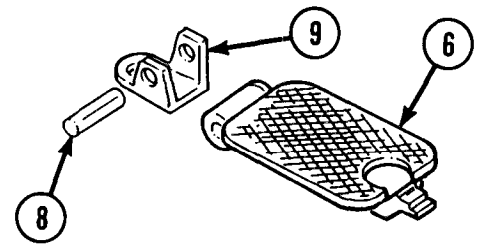


DOOR ASSEMBLY
(LIFT OUT)

Push down on plunger (5) with screwdriver and lift door assembly (6) out of butt plate (7).

3

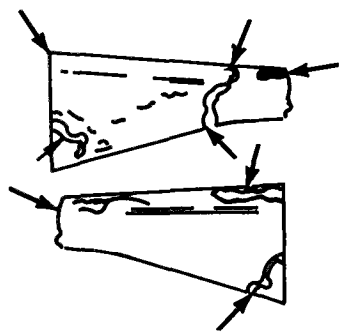
Remove straight pin (8) and separate hinge (9) and door assembly (6).

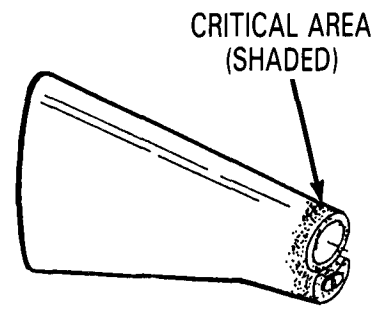


b. CLEANING Clean all items.

c. INSPECTION

Inspect buttstock assembly for dents, cracks, and chips. Check for breaks and separation of material which could prevent proper functioning of weapon.





Under the following conditions, hairline cracks originating from buttplate end of buttstock are acceptable. No chipped away material is allowed.

(1) One hairline crack, not to exceed one inch in length, per side of buttstock.

(2) Two additional hairline cracks up to .22 inch in length, per side of buttstock.

(3) A total of three cracks per side of buttstock, originating from buttplate end, are allowable.

Buttstocks with unauthorized markings stamped into their surfaces will be replaced. Unauthorized markings, scratched, etched, carved, etc, are acceptable if they do not extend into the fiber of the buttstock which may weaken it. These marks may lie at any location on the buttstock.

Cracks in the critical area at the front end of the buttstock are not acceptable and these buttstocks must be replaced.

Visually inspect all other parts for unserviceable or missing parts. Replace defective or missing parts.

2-21. BUTTSTOCK ASSEMBLY (CONT).

d. REPAIR

Replace all authorized unserviceable items. Unserviceable items are those items which are damaged.

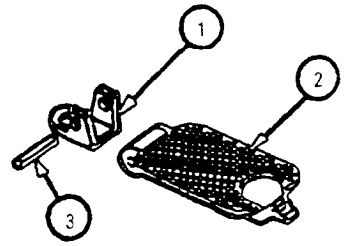
e. LUBRICATION

Lubricate all metal components with CLP, LSA, or LAW (p 2-22).

f. REASSEMBLY

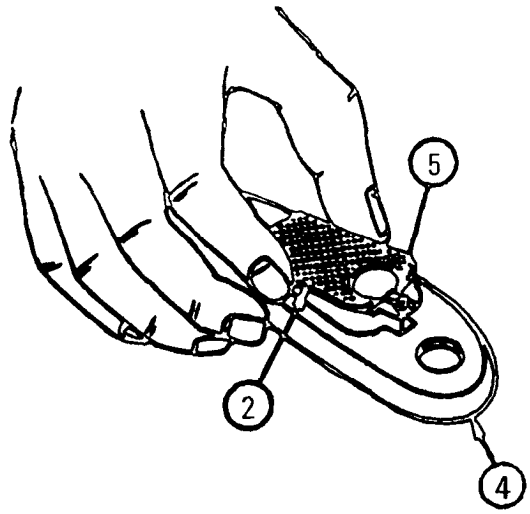
1

Position hinge (1) on door assembly (2) and install straight pin (3).



2

Install door assembly (2) into butt plate (4) and press plunger (5) to lock.

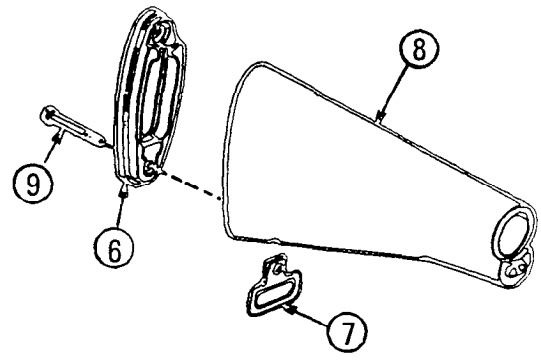


3

Position butt plate group (6) and rear sling swivel (7) to the buttstock (8) and secure with self-locking screw (9).

NOTE

See page 2-50, reassembly, for reassembly of buttstock assembly to lower receiver. 10.103 inches long (PN 9349126) 9.478 inches long (PN 8448654)



2-22. MAJOR COMPONENTS OF M16/M16A1 RIFLE.

This task covers:

a. Reassembly
b. Inspection
c. Stowage

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Reference
TM 9-1005-249-10 (operator's manual)

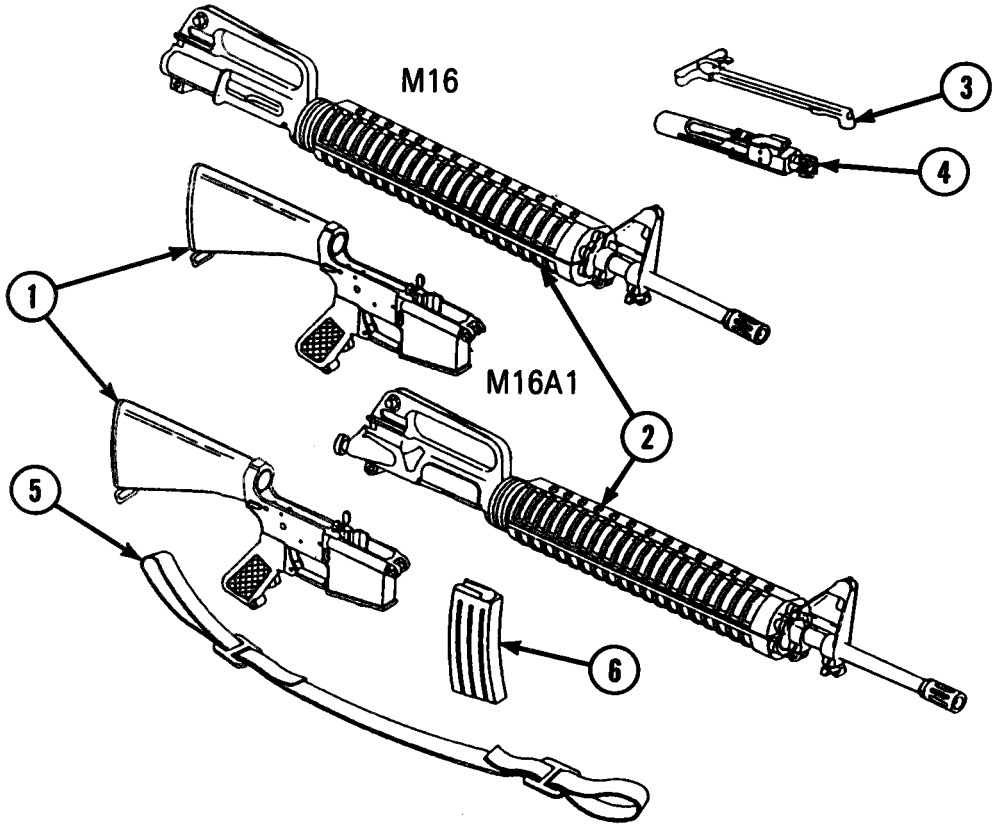
Equipment Condition
Weapon disassembled into major components

General Safety Instructions
To avoid injury to eyes, use care when removing and installing spring-loaded parts.
Do not interchange bolt assemblies from one weapon to another. Doing so may result in injury to, or death of, personnel.
Do not keep live ammunition near the work area.

a. REASSEMBLY

NOTE

Only direct support maintenance is authorized to restamp the serial number.



Refer to operator's manual and install lower receiver and extension assembly (1), upper receiver and barrel assembly (2), charging handle assembly (3), bolt carrier assembly (4), small arms sling (5), and cartridge magazine (6).

2-22. MAJOR COMPONENTS OF M16/M16A1 RIFLE (CONT).

b. INSPECTION

Perform the following function tests on assembled weapon:

1. Remove magazine if installed. Pull charging handle assembly to rear. Check that chamber is clear. Let bolt and bolt carrier close. Leave hammer in cocked position. Do not pull trigger.

WARNING

If weapon fails any of the following selector lever tests, continued use of the weapon could result in injury to, or death of, personnel.

2. Place selector lever in SAFE position and pull trigger. Hammer should not fall.
3. Place selector lever in SEMI position. Pull trigger. Hammer should fall.

NOTE

For the purpose of the following test "SLOW" is defined as 1/4 to 1/2 the normal rate of the trigger release:

4. Hold trigger to the rear, charge weapon, and release the trigger with a slow, smooth motion, without hesitations or stops, until the trigger is fully forward (an audible click should be heard). Hammer should not fall.
5. Repeat the above selector lever SEMI position test five times. The weapon must not malfunction during any of these five tests. If the weapon malfunctions during any of these five tests, evacuate it to direct support maintenance for repair.
6. Place selector lever in AUTO position. Charge weapon and pull trigger. Hammer should fall.
7. Hold trigger to the rear, charge weapon, and release trigger. Pull trigger. Hammer should not fall. Automatic sear should have released hammer while holding trigger in the pulled position before releasing and pulling the trigger.
8. With hammer in the forward position, attempt to place the selector lever in SAFE position. If the selector lever can be placed on SAFE by finger/thumb pressure, evacuate the rifle to direct support maintenance for repair.
9. If weapon fails any of the above tests, evacuate to direct support.

c. STOWAGE

Prior to stowing the rifle in arms room, perform the following procedures:

1. Clear. Refer to operator's manual.
2. Place selector lever in SEMI position.
3. Pull trigger. Hammer should fall.
4. Close ejection port (dust) cover.
5. Place rifle in rack.

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

CHAPTER OVERVIEW

Chapter 3 contains information and instructions to help keep the weapon in good repair. This chapter contains:

a. Repair Parts, Special Tools, TMDE, and Support Equipment
b. Service Upon Receipt
c. Troubleshooting
d. Decontamination of Rifles and Shop Area
e. Maintenance Procedures for the M16 and M16A1 Rifle
f. Preembarkation Inspection of Materiel in Units Alerted for Overseas Movement

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-1. COMMON TOOLS AND EQUIPMENT. For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit. Air Force and Coast Guard users must maintain the following common tools:

Flat tip screwdriver
Socket wrench handle and socket head screw socket wrench
Vise jaw caps
Machinist's vise
Solid center punch
Hammer
Combination wrench
(2) eight-inch adjustable wrenches
Flat file
Ballpeen hammer
Trigger Pull Test Fixture Rod & Weights
5/64-inch drive pin punch
Retaining ring pliers
1/8-inch drive pin punch
Torque wrench
1/16-inch drive pin punch
3/32-inch drive pin punch

3-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. Special tools required for direct support are listed in appendix C and fabricated tools are listed and illustrated in appendix E.

3-3. REPAIR PARTS. Repair parts are listed and illustrated in appendix C.

NOTE

Bolt assemblies and/or barrel assemblies may be interchanged at the Direct Support Maintenance level from one rifle to another, under the provisions of the note at the bottom of page 3-39. If these parts are interchanged, the weapon must be checked/inspected as depicted in paragraph 3-10, 3-11, and 3-13. While performing these checks/inspections pay special attention to the headspace requirements depicted on pages 3-38 and 3-39.

Section II. SERVICE UPON RECEIPT

3-4. GENERAL.

a. Inspect the weapon for damage incurred during shipment. If the equipment has been damaged, report the damage on SF Form 364, Report of Discrepancy (ROD).

b. Check the weapon against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions in DA PAM 738-750.

c. Check to see whether the equipment has been modified.

d. Check to see if all MWOs have been applied.

3-5. SERVICE UPON RECEIPT OF MATERIEL. Refer to the following table.

SERVICE UPON RECEIPT - M16/M16A1 RIFLE

LOCATION	ITEM	ACTION	REMARKS
M16, M16A1 Rifle	Charging handle	Clear the weapon.	Refer to TM 9-1005-249-10 (Operator's Manual)
	WARNING		
	To avoid injury to eye, use care when removing and installing spring-loaded parts.		
	Bolt carrier assembly and bolt assembly	Remove.	Refer to Operator's Manual
	All components	Visually inspect for proper assembly, damage, or for missing parts.	Refer to Operator's Manual
		Clean and lubricate (see p 2-22).	
	Bolt carrier assembly and bolt assembly	Reassemble.	Refer to Operator's Manual
		Hand function to assure proper operation.	
	Cartridge magazine	Insert empty magazine and pull the bolt to the rear. Check magazine for positive retention, and check functioning of bolt catch by assuring that bolt locks to the rear with empty magazine inserted.	Refer to Operator's Manual

Section III. TROUBLESHOOTING

3-6. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the 5.56mm Rifle M16 and M16A1. Each malfunction for the individual component, unit, or system is followed by a list of tests or inspections which will help you to determine the corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, see individual repair sections for maintenance instructions on each major assembly.

3-7. TROUBLESHOOTING PROCEDURES. Refer to troubleshooting table for malfunctions, tests, and corrective actions. The symptom index is provided for a quick reference of symptoms covered in the table.

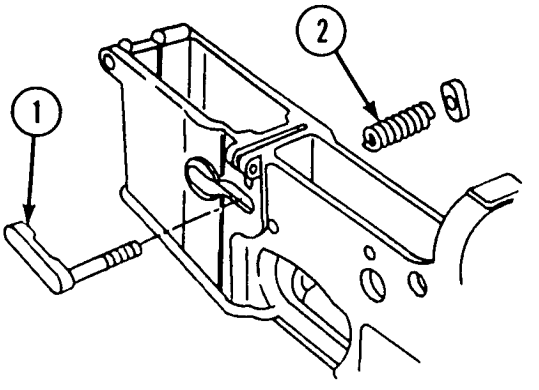
SYMPTOM INDEX

	Troubleshooting Procedures Page
Failure of magazine to lock in weapon	3-4
Failure to feed	3-4
Failure to chamber	3-4
Failure to lock	3-4
Failure to fire	3-5
Failure to unlock	3-5
Failure to extract	3-6
Failure to eject	3-6
Failure to cock	3-6
Short recoil	3-7
Weapon cannot be zeroed	3-8
Failure to cycle with selector lever set on AUTO	3-8
Fires when trigger is released with selector lever on SEMI, or fires two or more rounds in SEMI selector position (Doubling)	3-9
Fires with selector lever on SAFE	3-9
Bolt fails to lock to rear after firing last round	3-9

TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. FAILURE OF MAGAZINE TO LOCK IN WEAPON.



Step 1. Dirty or corroded magazine catch (1).

Disassemble and clean.

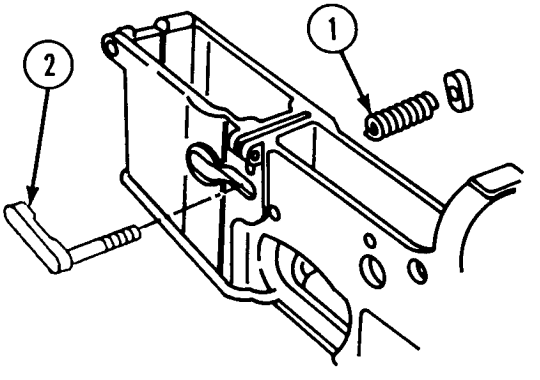
Step 2. Defective magazine catch spring (2).

Replace spring (2).

Step 3. Worn or broken magazine catch (1).

Replace magazine catch (1).

2. FAILURE TO FEED.



Step 1. Magazine catch spring (1) weak or broken.

Replace magazine catch spring (1).

Step 2. Magazine catch (2) broken or defective.

Replace magazine catch (2).

Step 3. Short recoil.

Refer to page 3-7.

3. FAILURE TO CHAMBER.

Obstruction in bore/chamber.

Remove obstruction. If unable to remove obstruction, rebarrel (P. 3-28).

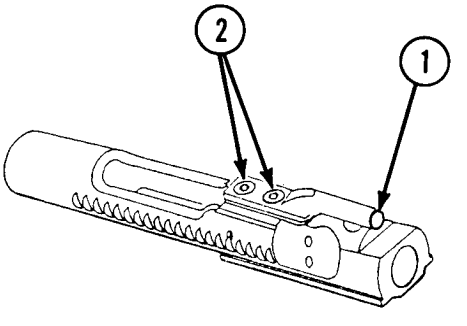
4. FAILURE TO LOCK.

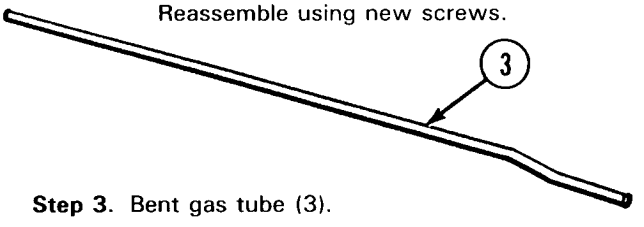
Step 1. Damaged bolt carrier key (1).

Repair or replace bolt carrier key (1) and check alignment.

Step 2. Loose screws (2) on bolt carrier key (1).

Disassemble and repair (p 3-19).
Reassemble using new screws.





Step 3. Bent gas tube (3).

Adjust by bending tube in area of handguards.
Replace gas tube (3) and check alignment.

TROUBLSHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. FAILURE TO FIRE.

Step 1. Broken hammer (1).

Replace hammer (1).

Step 2. Weak or broken hammer spring (2).

Replace spring (2).

Step 3. Hammer spring (2) improperly assembled.

Reassemble correctly (p 3-62).

Step 4. Selector lever (3) frozen on SAFE position.

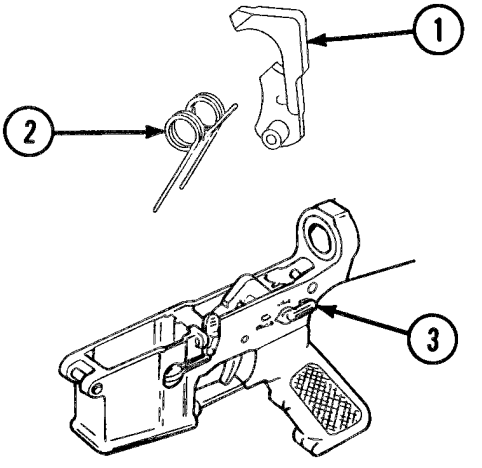
Disassemble and clean.

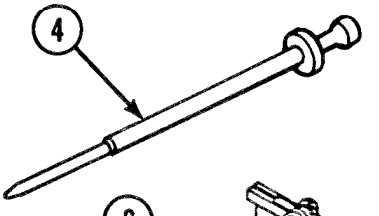
step 5. Broken firing pin (4) or firing pin does not meet gage protrusion requirement.

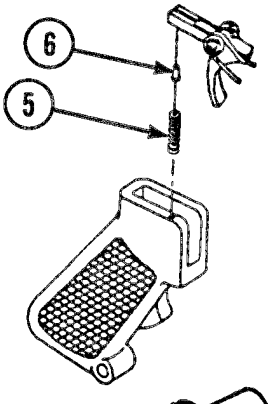
Replace.

Step 6. Damaged, dirty, or corroded spring (5) and detent (6).

Clean and/or replace if necessary.







6. FAILURE TO UNLOCK.

Step 1. Burred locking lugs (1) cm bolt assembly (2).

Remove burrs.

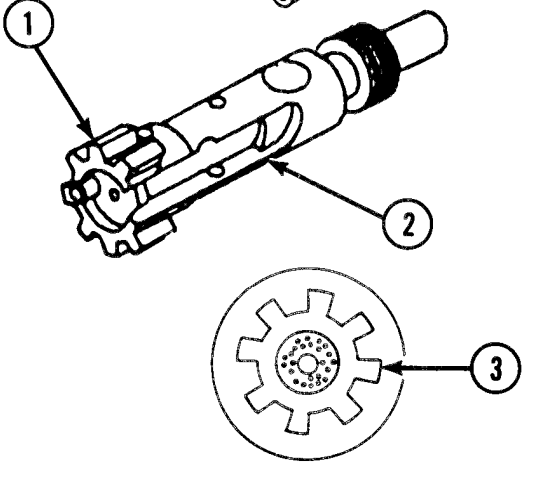
Step 2. Burred locking lugs (3) on barrel extension.

Remove burrs.

Step 3. See short recoil (p 3-70.

Step 4. Broken bolt assembly (2).

Replace bolt assembly (2).



MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7. FAILURE TO EXTRACT.

Badly pitted chamber (1).

Replace rifle barrel assembly.

8. FAILURE TO EJECT.

See short recoil (p 3-7).

9. FAILURE TO COCK.

Step 1. Worn or broken trigger nose (1) or trigger spring (2).

Replace trigger (3) or defective trigger spring (2).

Step 2. Worn or broken hammer trigger notch (4)

Replace hammer (5).

Step 3. Worn or broken hammer disconnector hook (6).

Replace hammer (5).

Step 4. Worn or broken hammer automatic sear hook (7).

Replace hammer (5].

Step 5. Worn or broken disconnector hook (8).

Replace disconnector (9).

Step 6. Weak broken, or missing trigger spring (10)

Replace spring (10).

Step 7. Worn, broken, or missing automatic sear(11).

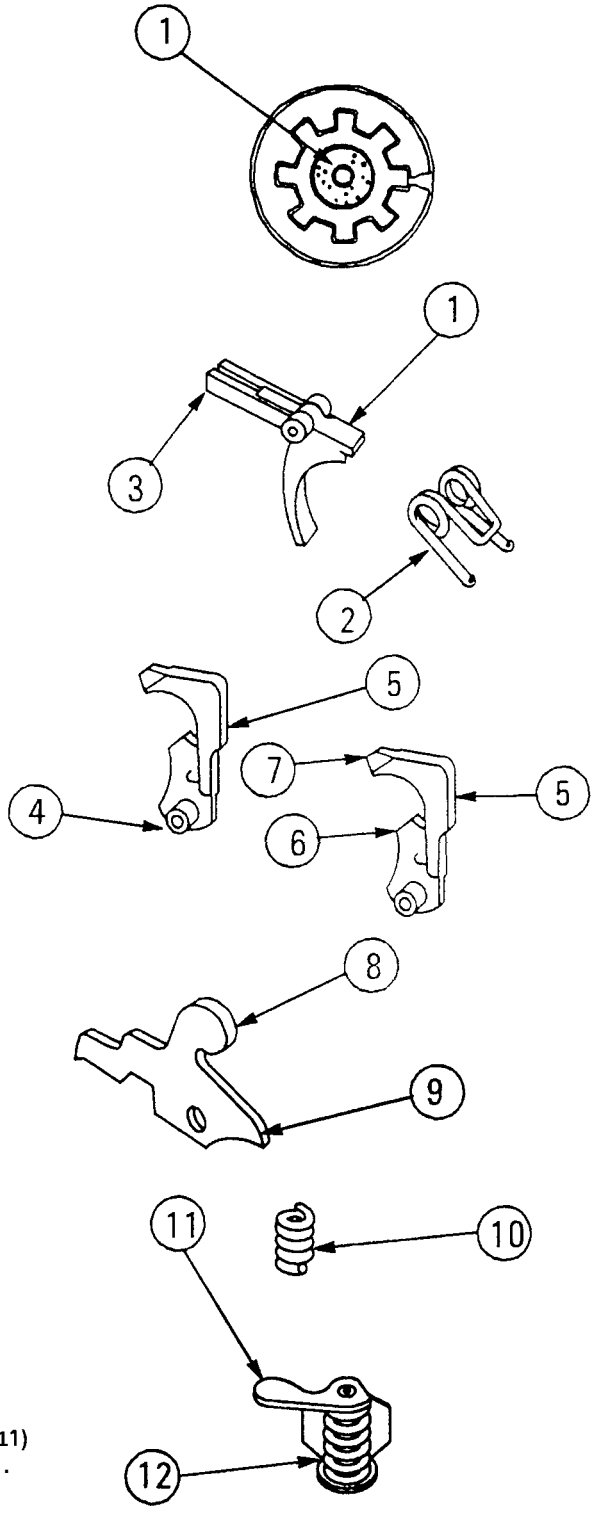
Replace automatic sear (11)

Step 8. Weak or broken automatic sear spring (1 2).

Replace automatic sear (11).

Step 9. Automatic sear spring (12) incorrectly assembled in receiver.

Remove automatic sear assembly (11) and install correctly (p 3-59).



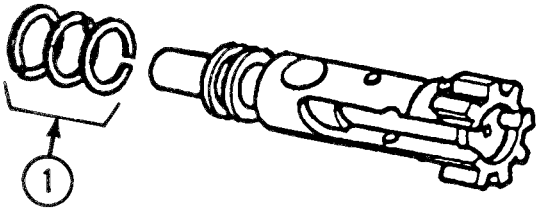
TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

10. SHORT RECOIL.

Step 1. Improper gap, space or **worn, missing, or broken bolt rings (1).**

Replace bolt **rings and stagger gaps.**



Step 2. Broken or bent gas tube (2).

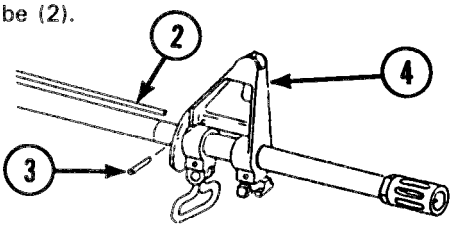
Adjust by bending in area of handguards or replace gas tube.

Step 3. Gas tube spring pin (3) missing from **front sight (4).**

Replace spring pin (3).

Step 4. Partially plugged gas system because of carbon buildup in the gas tube (2).

Replace gas tube (2).

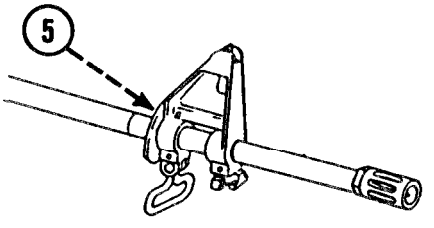


WARNING

When using P-C-111, avoid skin contact. If it comes in contact with the skin, wash off thoroughly with running water. Using a good lanolin base cream after exposure is helpful. Using rubber gloves is recommended.

Step 5. Carbon buildup in barrel gas port (5).

Remove carbon buildup by soaking in P-C-111 (item 8, app D). Wear rubber gloves (item 16, app D).



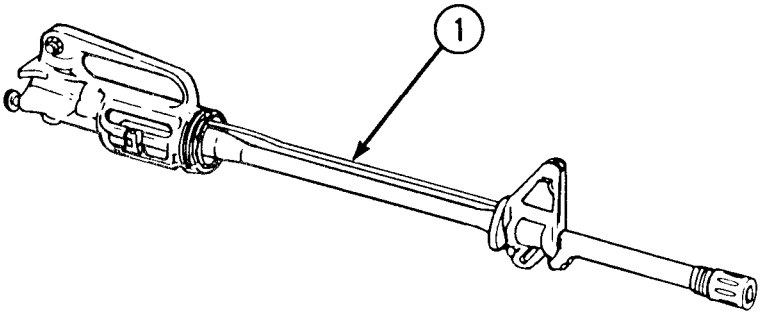
TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. **WEAPON CANNOT BE ZEROED**

Step 1. Bent or bulged rifle barrel (1).

Replace rifle barrel assembly (1).

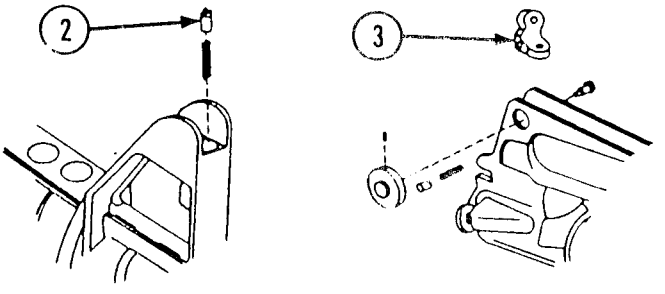


Step 2. Barrel assembly out of alignment with rear sight on upper receiver

Align barrel and upper receiver (p 3-33).

Step 3. Corroded front (2) or rear (3) sights.

Disassemble, clean, and lubricate.



12. **FAILURE TO CYCLE WITH SELECTOR LEVER SET ON AUTO.**

Step 1. Broken automatic sear (1) or spring (2)

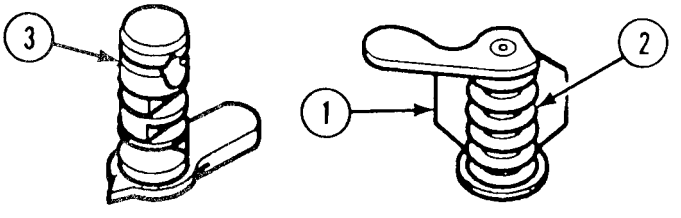
Replace automatic sear assembly (1).

Step 2. Faulty selector lever (3).

Replace selector lever (3).

Step 3. Short recoil.

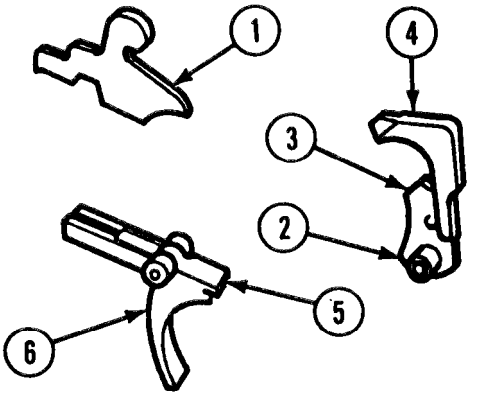
See malfunction 11.



TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

13. FIRES WHEN TRIGGER IS RELEASED WITH SELECTOR LEVER ON SEMI, OR FIRES TWO OR MORE ROUNDS IN SEMI SELECTOR POSITION (DOUBLING).



Step 1. Defective disconnector (1).

Replace disconnector (1).

step 2. Worn or broken hammer trigger notch (2).
Worn or broken hammer disconnector notch (3).

Replace firing hammer (4).

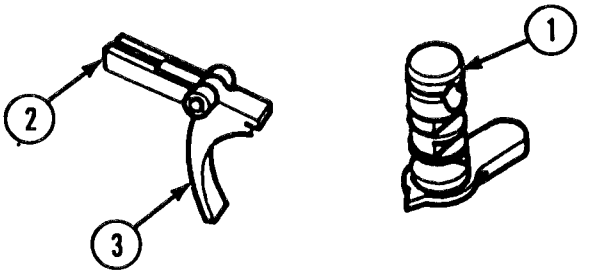
step 3. Worn or broken trigger nose (5).

Replace trigger (6).

Step 4. Worn trigger or hammer pin hole. Gage trigger and hammer pin holes.

If gage 12006472 enters any of the four holes, replace weapon (p 3-57).

14. FIRES WITH SELECTOR LEVER ON SAFE.



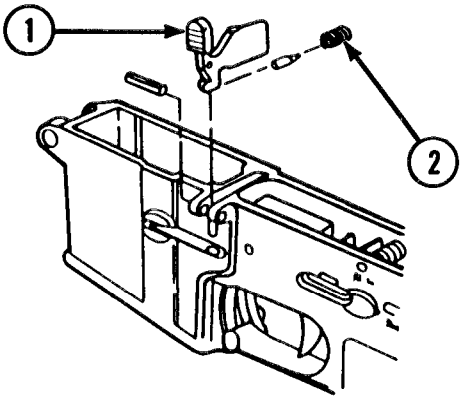
Step 1. Defective selector lever (1).

Replace selector lever (1).

Step 2. Worn or broken trigger (rear portion (2).

Replace trigger (3).

15. BOLT FAILS TO LOCK TO REAR AFTER FIRING LAST ROUND.



Step 1. Broken bolt catch (1).

Replace bolt catch (1).

Step 2. Weak or broken bolt catch spring (2).

Replace bolt catch spring (2).

Step 3. Restricted movement of bolt catch (1).

Disassemble and clean.

Section IV. DECONTAMINATION OF RIFLES AND SHOP AREA

3-8. DECONTAMINATION OF SIGHTS ACTIVATED WITH TRITIUM (H3). Refer to Chapter 2 Section V for procedures.

Section V. MAINTENANCE PROCEDURES FOR THE M16 AND M16A1 RIFLE

3-9. MAJOR COMPONENTS OF M16 AND M16A1 RIFLE.

This task covers disassembly.

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Reference
TM 9-1005-249-10 (operator's manual)

Equipment Condition
Weapon assembled

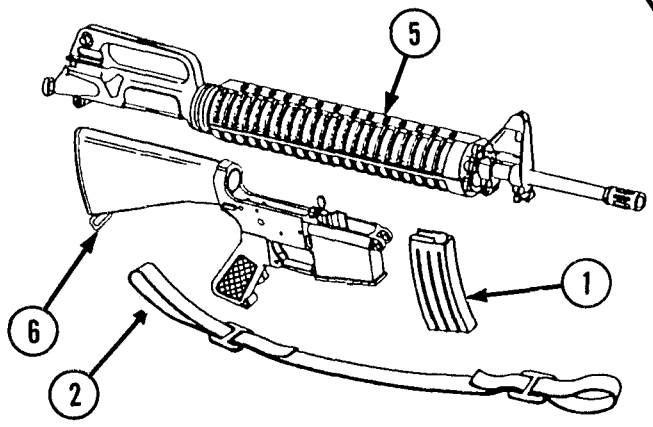
General Safety Instructions
Before starting an inspection, be sure to clear the weapon. Do not actuate the trigger until the rifle has been cleared.
Inspect the chamber to ensure that it is empty and no ammunition is in position to be chambered. Do not keep live ammunition near work area.

WARNING

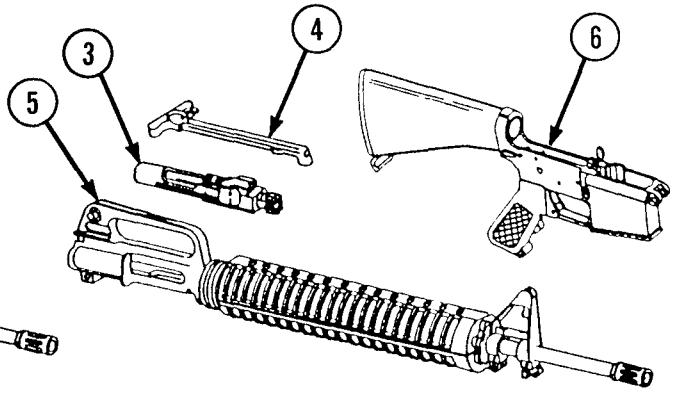
Before starting an inspection on a weapon equipped with a low light level sight, check for damage to the low light level sight. See procedures listed on page 2-21.

DISASSEMBLY

a. Refer to TM 9-1005-249-10.
b. Remove cartridge magazine (1), small arms sling (2), bolt carrier assembly (3), charging handle (4), upper receiver and barrel assembly (5), and lower receiver and extension assembly (6).



M16A1



M16

3-10. BOLT CARRIER ASSEMBLY.

This task covers:

a. Disassembly
b. Inspection
c. Test
d. Repair
e. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Test Equipment
Tool and Gage Set 8426685

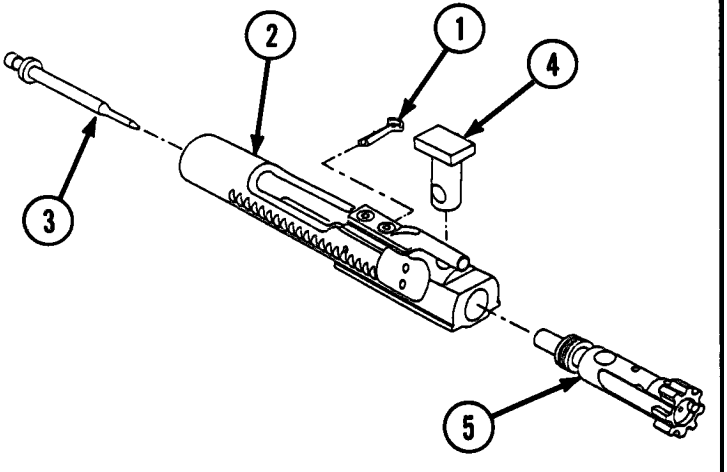
Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)
Wiping Rag (item 24, app D)

Equipment Condition
Page Condition Description
3-10 Bolt carrier assembly removed

a. DISASSEMBLY

1. Remove firing pin retaining pin (1).
2. Tip key and bolt carrier assembly (2) allowing firing pin (3) to drop out. Catch the firing pin.
3. Rotate bolt cam pin (4) 1/4 turn and lift straight up to remove.
4. Remove bolt assembly (5) from key and bolt carrier assembly (2).



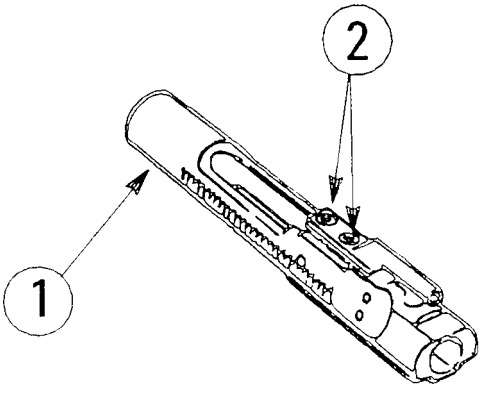
3-10. BOLT CARRIER ASSEMBLY (CONT).

b. INSPECTION

1

[a] Inspect bolt carrier assembly (1) for burrs, cracks, wear, and evidence of gas loss.

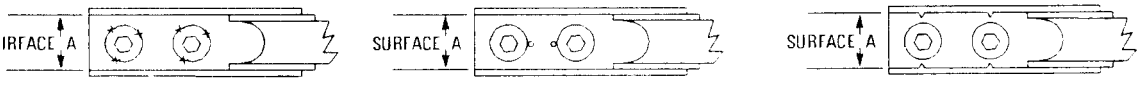
[b] Visually inspect the carrier and key screws (2) for looseness and proper staking as shown below.



NOTE

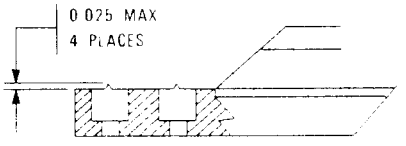
Do not attempt to retorque if there is no loosening of the screws indicated by the staking marks.

Surface "A' must not indicate distortion or damage which impairs parallelism.



FIELD REPLACEMENT STAKING

ORIGINAL STAKING



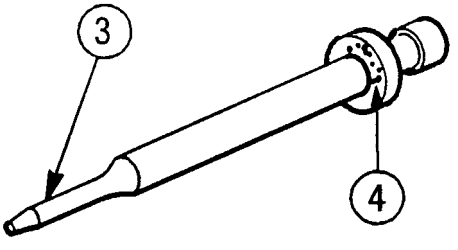
NOTE

There are bolts and bolt carriers on fielded weapons, some with chrome-plated exterior surface finishes and some with phosphate coating. Both finishes are acceptable under certain operational requirements and/or restrictions. Phosphate-coated bolt carriers are required for divisional combat units. Chrome-plated bolt carriers are acceptable for divisional noncombat units and training center units. Chrome-plated and phosphate-coated bolt assemblies, bolt carrier assemblies, and repair parts for these assemblies may be intermixed in any combination, with the following exception:

Phosphate-coated bolt carriers are required for all deployable and deploying units. Chrome-plated bolt carriers are acceptable for nondeployable and training center units.

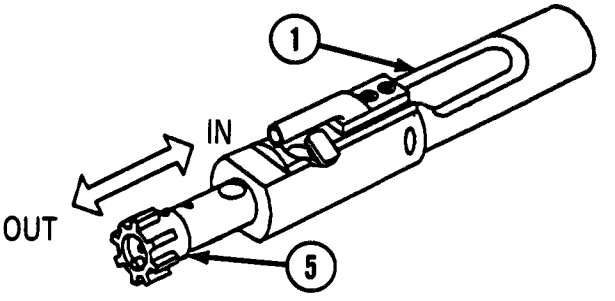
2

Inspect firing pin (3) tip for proper contour. Inspect for pitting, wear, and burrs. Pits or wear in area (4) is permissible. Replace if unserviceable.



3

Prior to reassembly, insert bolt assembly (5) in to bolt carrier assembly (1), and exercise bolt in and out of bolt carrier assembly. Check for binding.

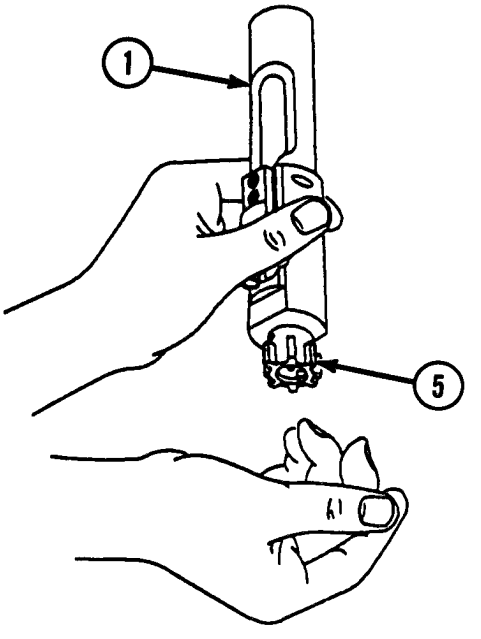


4

Check bolt assembly (5) for proper fit. Turn bolt carrier assembly (1) and suspend so the bolt assembly is pointed down.

NOTE

The bolt assembly (5) must not drop out. If weight of bolt assembly allows it to drop out of carrier assembly, replace bolt rings (p 3-18).



c. TEST

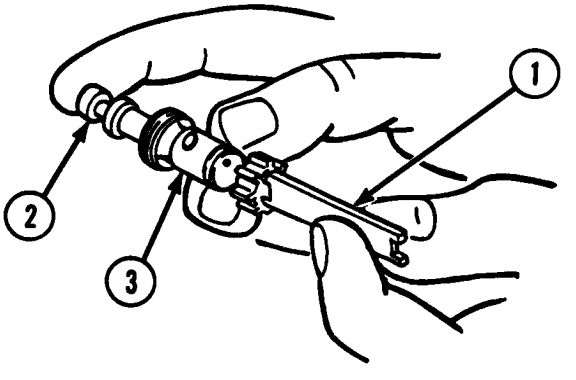
1. Insert firing pin (2) through bolt assembly (3).

2. Position firing pin protrusion gage (1) PN 7799735 to check for proper firing pin (2) protrusion (minimum 0.028- maximum 0.036).

NOTE

Firing pin should touch the gage on minimum but should not touch on maximum.

3. Replace a defective firing pin.



3-10. BOLT CARRIER ASSEMBLY (CONT).

d. REPAIR

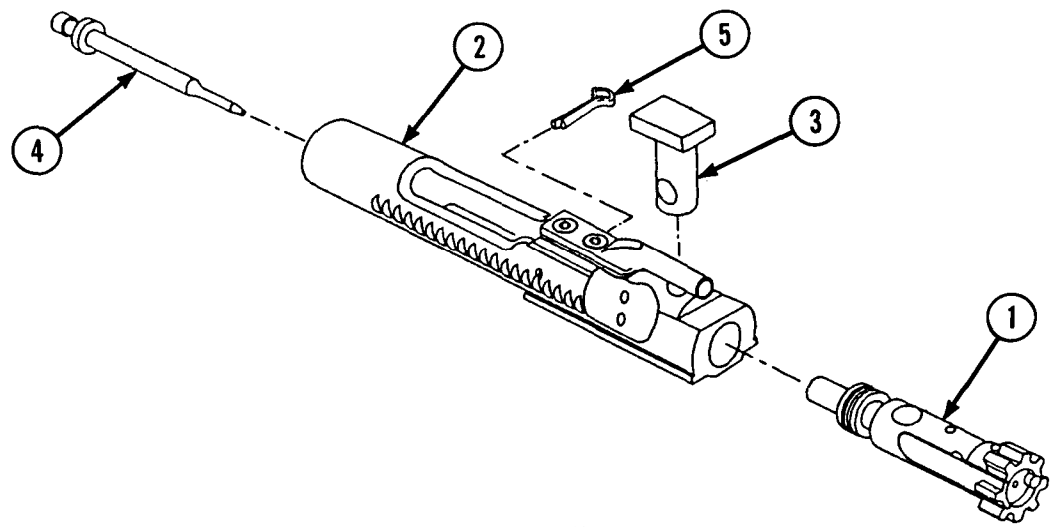
1. Replace all authorized unserviceable items.

NOTE

Be sure to retest a replaced firing pin, key and bolt carrier assembly, bolt assembly, or bolt carrier assembly.

2. Lubricate all metal parts using CLP, LSA, or, LAW (see p 2-22).

e. REASSEMBLY



WARNING

Bolt cam pin must be installed or weapon will blow up while firing the first round. If the cam pin is not installed, injury to, or death of, personnel may result.

NOTE

Before installing bolt assembly, check to see that the ring gaps are staggered to prevent loss of gas pressure.

1. **Install bolt assembly (1) into key and bolt carrier assembly (2).**

2. **Install bolt cam pin (3) and rotate 1/4 turn to secure bolt assembly (1).**

3. **Hold key and bolt carrier assembly (2) with bolt assembly (1) down and drop in firing pin (4).**

4. **Install firing pin retaining pin (5) from left side only to ensure proper installation. Check for proper installation by attempting to shake out firing pin.**

3-11. BOLT ASSEMBLY.

This task covers:

a. Disassembly
b. Inspection/Repair
c. Test
d. Clean/Lubricate
e. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Test Equipment
Tool and Gage Set 8426685

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Materials/Parts
Cleaner, Lubricant and Preservative (CLP) (item 9, app D)
Lubricating oil, weapon (LAW)
Lubricating oil, weapon (LSA)
Gloves, protective (item 16, app D)
Penetrant kit (item 23, app D)
Rag, wiping (item 24, app D)

Equipment Condition

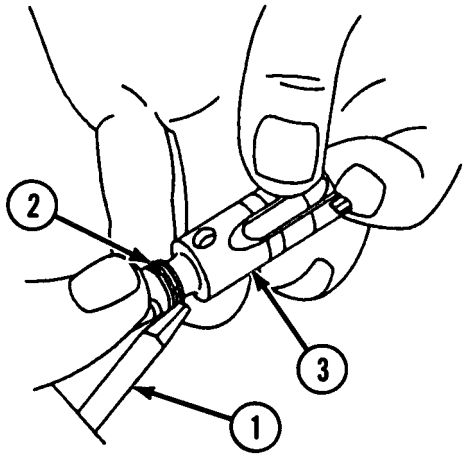
Page	Condition Description
3-10	Bolt carrier assembly removed
3-11	Bolt assembly removed

a. DISASSEMBLY

NOTE

Do not remove bolt rings unless they require replacement.

Using flat tip screwdriver (1) remove the three bolt rings (2) from the bolt (3).



b. INSPECTION/REPAIR

1

(a) Visually inspect bolt rings for cracks, kinks, and bends.

(b) Replace all three bolt rings if one or more rings is damaged. See page 3-7 for bolt ring wear check.

3-11. BOLT ASSEMBLY (CONT).

b. inspection/REPAIR (CONT).

2

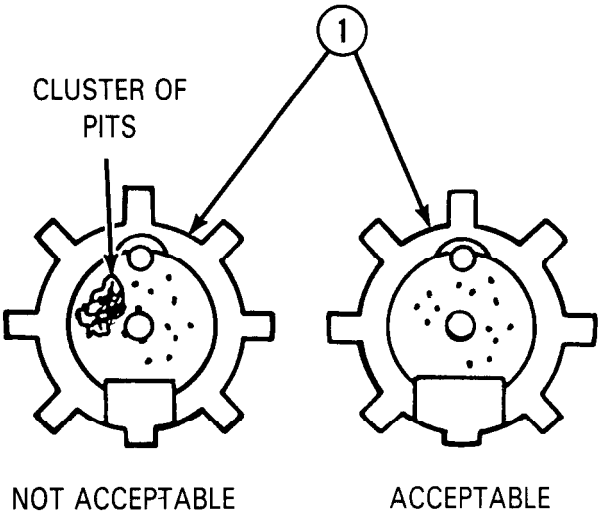
Inspect bolt (1) for pits, burrs, and wear as follows:

(a) **Bolt faces with a cluster of pits which are touching or tightly grouped, covering an area measuring approximately 1/8 inch across, will be rejected and replaced.**

(b) **Bolts which contain individual pits or a scattered pattern will not be cause for rejection.**

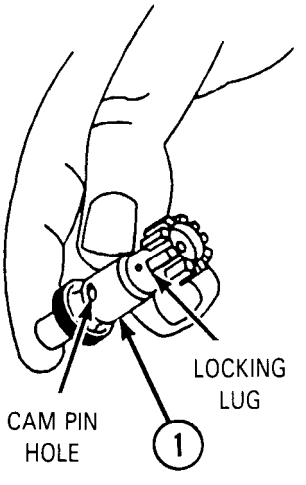
(c) **Bolts that contain pits extending into the firing pin hole will not be rejected unless firing pin hole gaging check determines excess wear.**

(d) **Rings on the bolt face (machine tool marks), grooves, or ridges less than approximately 0.010 inch will not be cause for rejection.**



3

Inspect bolt (1) for cracks especially in the locking lugs at the locking lugs base, and the cam pin hole area. Use black light if available; otherwise, use a glass of no more than 3X magnification or use a penetrant kit.



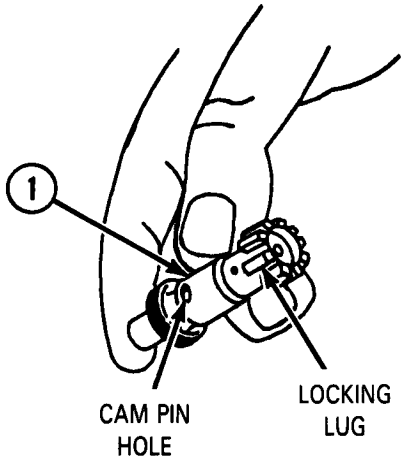
4

WARNING

Dry cleaning solvent is flammable and toxic and should be used in a well-ventilated area. The use of rubber gloves is necessary to protect the skin when washing rifle parts.

Use penetrant kit as follows:

The area to be inspected must be clean, free of oil, etc. Spray a small amount of remover on the area to be inspected, let dry, and wipe off with a wiping rag.



5

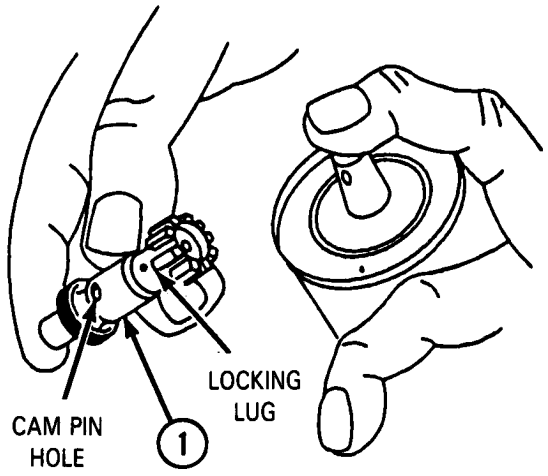
Spray penetrant (only enough to wet the area) on the area of the bolt (1) to be inspected.

Spray developer over the penetrant and let the developer work. Cracks will be indicated by a change in color where there is a crack. If there are cracks, the component is unserviceable.

Pay close attention to the area where the locking lugs meet the body.

If there are no cracks, spray remover on the area, let dry, and wipe off with a wiping rag. Oil the area to prevent corrosion.

Replace bolt assembly if bolt (1) is defective.



NOTE

Replacement of the bolt assembly will require that the headspace be tested (p 3-38, TEST).

3-11. BOLT ASSEMBLY (CONT).

c. TEST

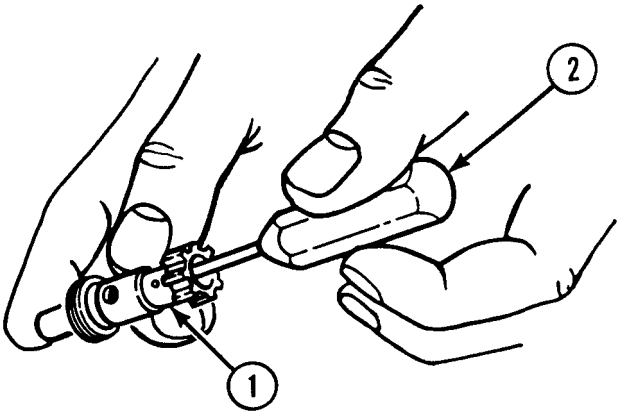
NOTE

Do not force the gage into bolt assembly.

Inspect bolt (1) for elongated or oversized firing pin hole using special no-go plug gage (2) PN 12620101.

NOTE

Bolts with firing pin hoes which permit the special no-go plug gage to fully penetrate at any position on the circumference will be rejected and replaced.



d. CLEAN/LUBRICATE

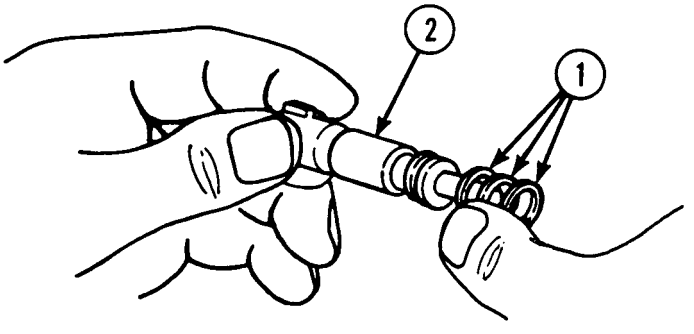
Clean all items (operator's manual). Remove carbon deposits with CLP or RBC. Lubricate all items with a light coat of CLP, LSA, or LAW.

e. REASSEMBLY

Install the three bolt rings (1) one at a time onto the bolt (2) using care not to bend them. Stagger the bolt ring gaps to prevent loss of gas pressure.

NOTE

Make certain ring gaps are staggered to prevent loss of gas pressure.



3-12. KEY AND BOLT CARRIER ASSEMBLY.

This task covers:

a. Disassembly
b. Repair
c. Reassembly

INITIAL SETUP

Applicable Configuration
M16/M16A1 Rifle

Tools
Field Maintenance Basic Less Power Small Arms Shop Set SC 4933-95-CL-A11 (19204)
Small Arms Repairman Tool Kit SC 5180-95-CL-A07 (19204)
Key tool (fig E-3, app E)

Equipment Condition
Page Condition Description
3-10 Key and Bolt Carrier Assembly removed
3-11 Bolt assembly removed

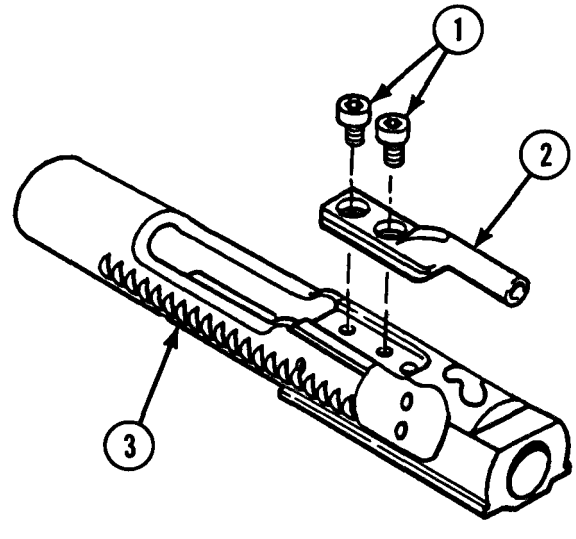
a. DISASSEMBLY

NOTE

Do not disassemble the key and bolt carrier assembly unless the bolt carrier key or bolt carrier is defective. New screws must be used if disassembled.

1. **Using socket wrench handle and socket head screw socket wrench, remove the carrier and key screws (1).**

2, Remove bolt carrier key (2) from bolt carrier (3).



3-12. KEY AND BOLT CARRIER ASSEMBLY (CONT).

b. REPAIR

NOTE

Do not reuse old screws. New screws must be used at assembly.

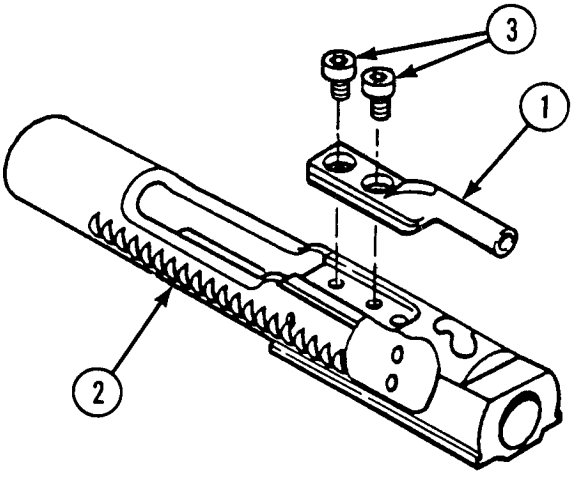
Repair by cleaning mating surfaces, replacing, properly torquing, and restaking carrier and key screws

c. REASSEMBLY

1

(a) If disassembled, install and position bolt carrier key (1) on bolt carrier (2).

(b) Install two carrier and key screws (3). Always use new screws.



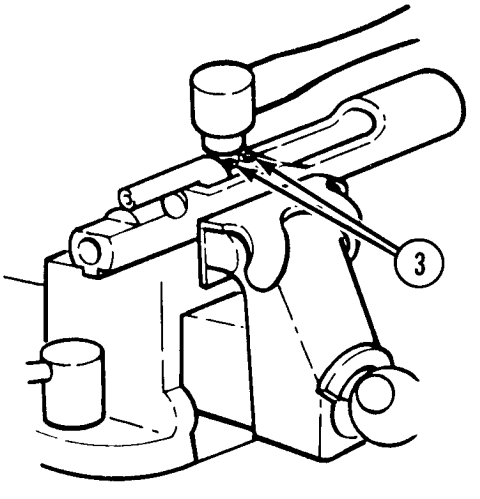
2

Place bolt carrier in machinist's vise using vise jaw caps.

NOTE

Do not reuse old screws.

Use a socket head screw wrench attachment and torque wrench to torque the carrier and key screws (3) to 35 to 40 inch-pounds.

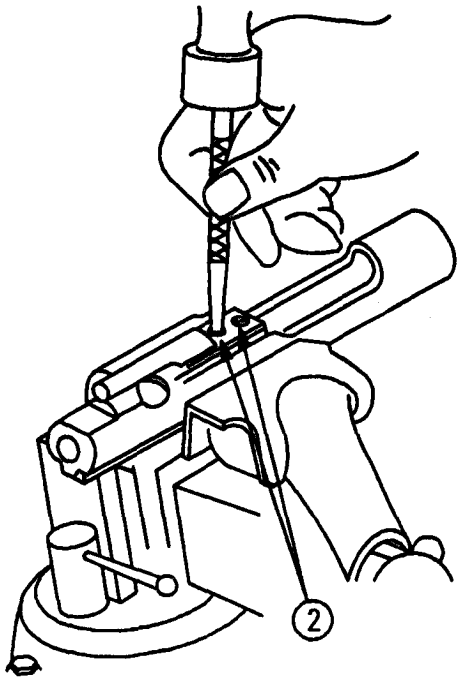


3

NOTE

The method of staking will be accomplished as pictured below.

Use solid center punch, and hand hammer to stake the two carrier and key screws (2) in three places.

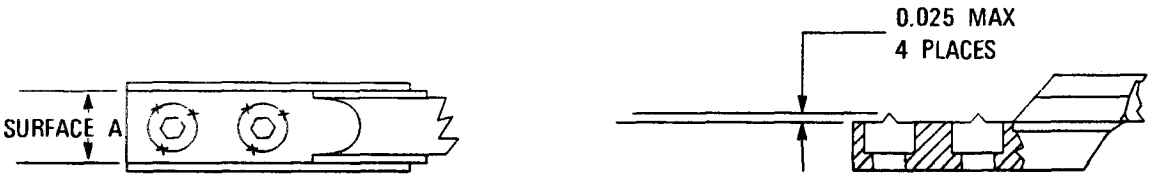


4

Stake carrier and key screws.

NOTE

A maximum of 0.025 inch protrusion in an upward direction is permissible.



FIELD REPLACEMENT STAKING

NOTE

If the bolt carrier key is replaced, three to eight rounds of blank or ball ammunition must be fired to insure a seal is created. Manual operation of the rifle may be required. If blank ammunition is utilized, M15A2 Blank firing Attachment must be adapted.

3-13. UPPER RECEIVER AND BARREL ASSEMBLY.

This task covers:

a. Disassembly
b. Inspection/Cleaning
c. Repair
d. Reassembly
e. Test

INITIAL SETUP

Applicable Configuration
M 16/M16A1 Rifle

Test Equipment
Tool and Gage Set 8426685

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-AO7 (19204)
Field Maintenance Basic Less Power Small Arms
Shop Set SC 4933-95-CL-A11 (19204)

Materials/Parts
Carbon removing compound (P-C-111) (item 8, app D)
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Cleaning compound, rifle bore (RBC) (item 11, app D)
Cloth, abrasive (item 12, app D)
Dichloromethane, technical (item 14, app D)
Dry cleaning solvent (item 15, app D)
Gloves, chemical and oil protective (item 16, app D)
Grease, molybdenum disulfide (item 17, app D)
Lubricant, solid film (item 19, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)
Pan, wash (item 22, app D)
Sealing compound (item 26, app D)

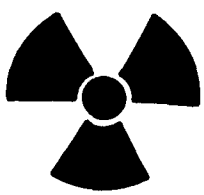
References
FM 23-9
TM 9-1005-249-10 (operator's manual)

Equipment Condition

Page	Condition Description
2-35	Hand guards removed
3-10	Upper receiver and barrel assembly removed from lower receiver and extension assembly.

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.
When using solid film lubricant or dichloromethane, be sure the area is well ventilated.
When using P-C-111, avoid skin contact. If P-C-111 comes in contact with the skin, wash thoroughly with running water. Using a good lanolin base cream after exposure to the compound is helpful. Using gloves and protective equipment is recommended.
Dry cleaning solvent is flammable and toxic and should be used in a well-ventiliated area. The use of rubber gloves is necessary to protect the skin when washing rifle parts.

WARNING



Upper receiver and barrel assembly may be equipped with low light level front and rear sights. The front sight contains radioactive material. If so equipped, do not insert metal objects into the post slot or otherwise treat roughly to cause breakage of the radioactive element.

a. DISASSEMBLY

1

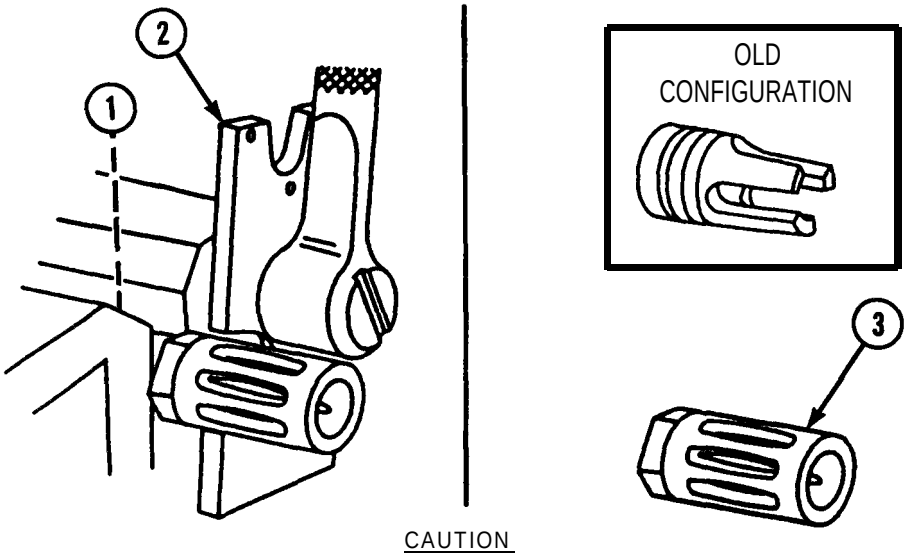
WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

When using solid film lubricant or dichloromethane, be sure the area is well ventilated.

When using P-C-1 11, avoid skin contact. If P-C-111 comes in contact with the skin, wash thoroughly with running water. Using a good lanolin base cream after exposure to compound is helpful. Using gloves and protective equipment is recommended.

Upper receiver and barrel assembly may be equipped with low light level front and rear sights. The front sight contains radioactive material. If so equipped, do not insert metal objects into the post slot or otherwise treat roughly to cause breakage of the radioactive element.



CAUTION

When using the barrel removal fixture, always insert the barrel from the same direction to avoid damage to the fixture.

(a) Position upper receiver and barrel assembly (1) in barrel removal fixture and secure both in machinist's vise.

(b) Using combination wrench (2) and 1/2 inch-drive handle, remove flash suppressor (3).

NOTE

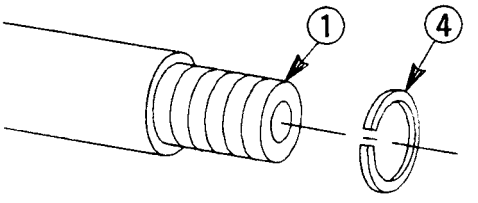
There are two types of flash suppressors. The earliest design is open ended with three prongs. The latest is a closed-end design and is the only authorized repair part.

All M 16A1 rifles assigned to divisional combat units must be equipped with the closed end flash suppressor. M 16A1 rifles assigned to noncombat unit and training center units may be equipped with either the open or closed end type flash suppressor. If the old type flash suppressor is removed, it must be replaced with the new type flash suppressor.

3-13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

a. DISASSEMBLY (CONT).

2

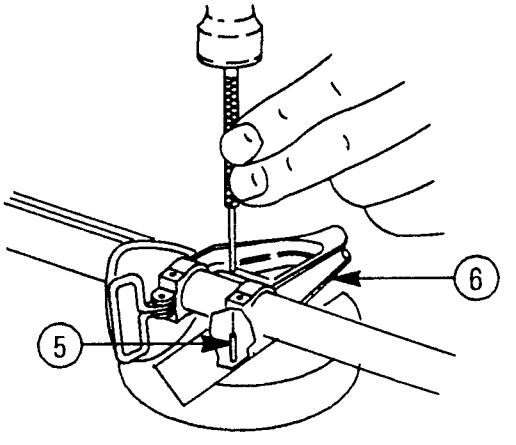


(a) Remove lockwasher.

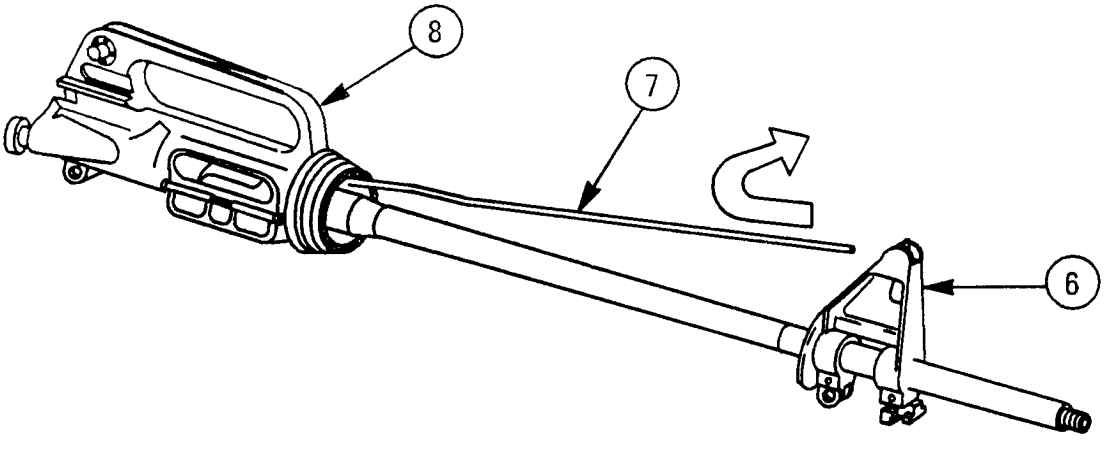
(b) Remove upper receiver and barrel assembly (1) from barrel remover fixture and vise.

3

Using ball peen hammer and 5/64 inch-diameter drive pin punch, remove spring pin (5) (which retains the gas tube) from the front sight assembly (6).

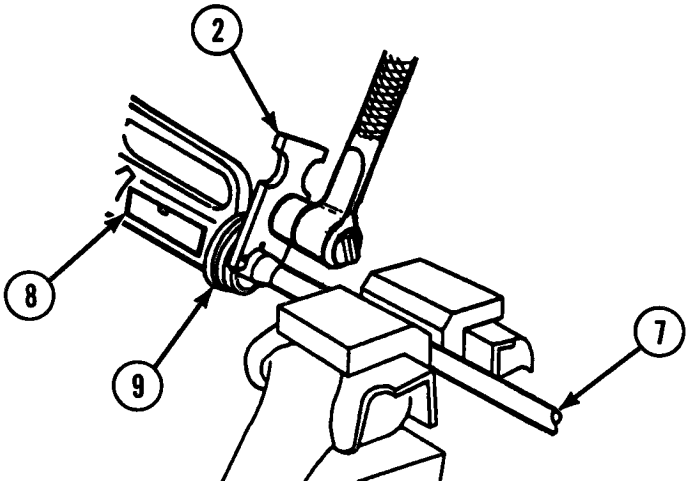


4



Slide gas tube (7) back into upper receiver (8) to clear front sight assembly (6). Then lift slightly, pull forward, and remove gas tube (7).

5



(a) **Place upper receiver and barrel assembly (1) into barrel removal fixture and clamp into machinist's vise.**

CAUTION

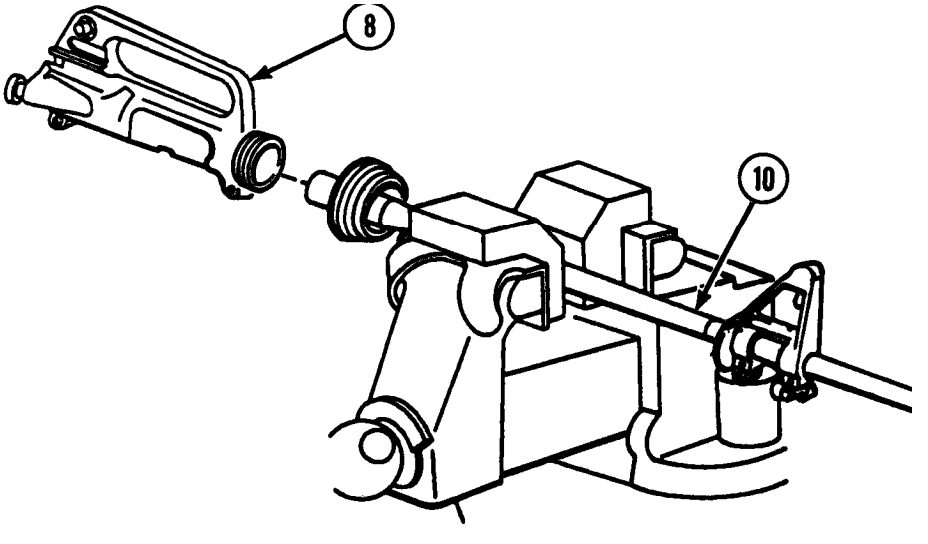
When using the barrel removal fixture, always insert the barrel from the same direction to avoid damage to the fixture.

NOTE

Be sure all three drive pins on combination wrench are engaged with barrel nut assembly (9). **Wrench must be pushed toward upper receiver (8) to compress the slip ring spring in barrel nut assembly (9).**

(b) Using socket wrench handle and combination wrench (2), loosen barrel nut assembly (9).

6



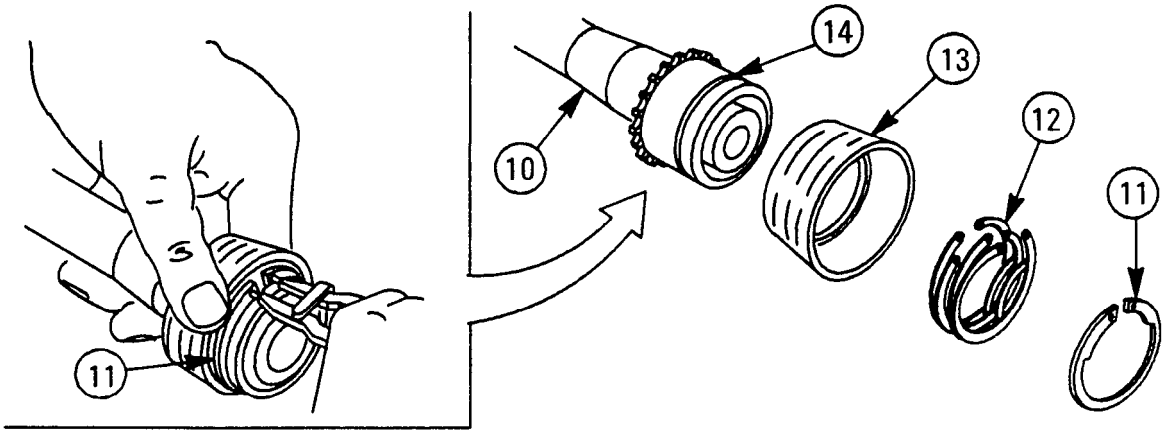
(a) Separate upper receiver assembly (8) from barrel assembly (10).

(b) **Remove rifle barrel assembly (10) from vise and barrel removal fixture.**

3-13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

a. DISASSEMBLY (CONT)

7



(a) Remove retaining ring (1 1) using retaining ring pliers.

(b) Remove slip ring spring (12) and handguard slip ring (13).

(c) Do not remove barrel nut (14) from rifle barrel assembly (10).

b. **INSPECTION/CLEANING**

1

(a) Inspect gas tube for cracks and deformities. Replace if defective.

(b) **Use P-C-111 carbon removing compound to remove carbon deposits from interior and exterior of gas tube. If a large amount of carbon is found and cannot be removed, replace the gas tube.**

(c) Visually inspect all other parts for unserviceable or missing parts. Replace defective or missing parts.

2

(a) Inspect rifle bore and locking lugs for burrs, cracks, rust, bulges, and pits.

(1) Pits no wider than a land or groove and no longer than 3/8 inch are allowed in the bore.

(2) Lands that appear dark blue due to coating of gilding metal from projectiles are allowable.

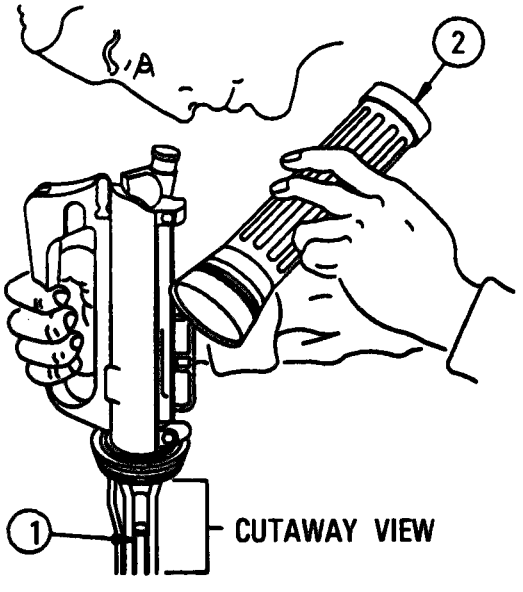
(3) Definitely ringed bores or bores ringed sufficiently to bulge the outside surface of the barrel are cause for rejection. Replace rifle barrel assembly if defective.

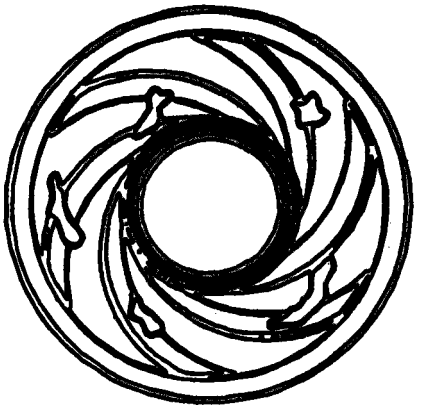
NOTE

Chamber may be inspected with or without upper receiver assembled to the barrel assembly.

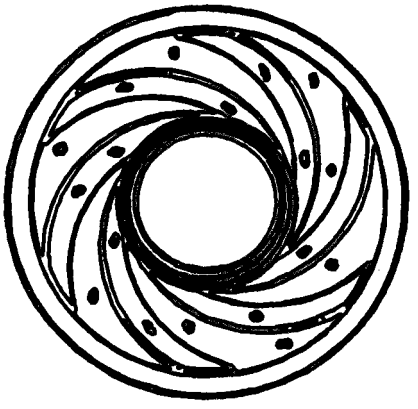
(b) Inspect chamber using reflector tool 1) and flashlight (2).

Pits 1/8 inch in length are cause for rejection. Replace rifle barrel assembly if defective.





NOT ACCEPTABLE



ACCEPTABLE

3-13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

c. REPAIR

1. Replace all authorized unserviceable items.

2. Straighten bent front sight guards (1) as follows:

CAUTION

Remove spring before heating. (Heat will damage spring.) The sight post and plunger may be reused unless damaged.

(a) Remove front sight post, plunger, and spring (see p 2-38).

(b) Place front sight base (2) in a bench vise.

Use copper or brass caps (jaw inserts) on vise to prevent damage to sight base (2) during clamping.

(c) Heat front sight guards (1) and bend with pliers. The front sight guards (1) should be put back as nearly as possible to the original position. Allow front sight housing to air cool.

WARNING

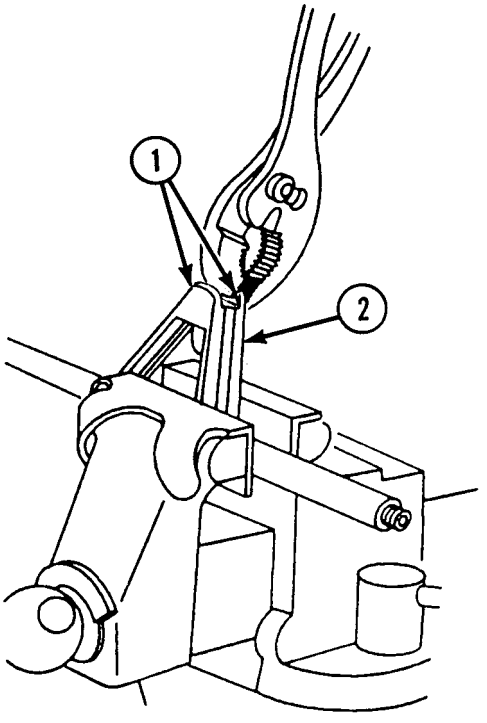
Dry cleaning solvent is flammable and toxic and should be used in a well-ventilated area. The use of rubber gloves is necessary to protect skin when washing rifle parts.

(d) Roughen any damaged surface of front sight guard with abrasive cloth and clean with dry cleaning solvent. Wear rubber gloves and use a wash pan to apply solvent.

CAUTION

Do not allow solid film lubricant to flow into front sight post threaded well.

(e) Apply solid film lubricant to cover the damaged finish.



3. Slightly bent barrels may be straightened as follows.

(a) Check straightness using straightness gage (3) 8448202 (p 3-37). If the barrel fails the straightness test, and the gage remains in the barrel in the area of the front sight, perform step (b) to determine if it may be straightened.

(b) With the gage remaining in the bore, hold the rifle in a vertical position with the end of the barrel into which the gage was inserted pointing up. Insure that if/when the gage passes through the barrel it will not be damaged. Using hand pressure ONLY, flex the portion of the barrel between the front sight and the flash suppressor in all four directions (left, right, forward and back). If the barrel is only slightly bent, the gage will drop through when the barrel is flexed in one of these directions. Note the direction which allowed the gage to drop through the barrel.

CAUTION

Remove the gage from the barrel before continuing.

NOTE

If the gage does not pass through the barrel when it is flexed, remove the gage and replace the barrel assembly.

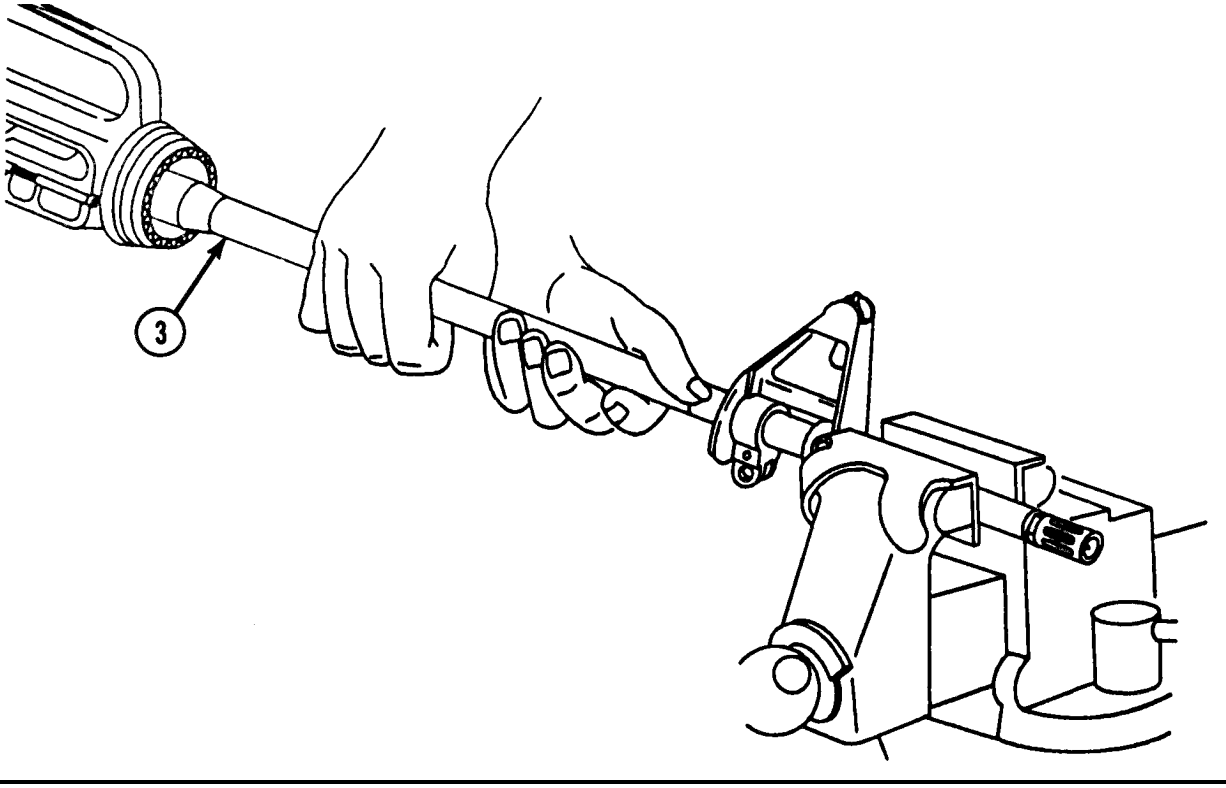
(c) Place the barrel in a vise using appropriate protective jaws. Clamp the barrel between the front sight assembly and the flash suppressor approximately one inch from the front sight assembly. The barrel assembly should be in a horizontal position with the side noted in step (b) toward you.

CAUTION

Do not apply pressure to the receiver.

(d) Grasp the BARREL near the receiver so that when force is applied the barrel will flex in the same direction as noted in step (b).

(e) Give the barrel a sharp jerk of approximately 20 to 40 pounds of force.



3-13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

c. REPAIR (CONT)

(f) Remove the barrel from the vise and recheck straightness (step (a)).

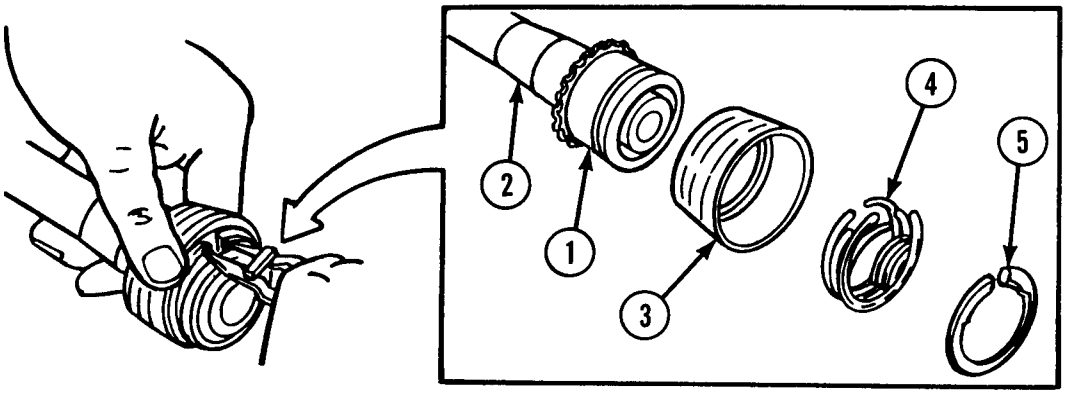
(g) If gage still will not pass through the barrel, perform step (b) to determine direction of bend. If the barrel is still bent in the same direction as before, perform steps (c) through (f) using slightly more force. If the barrel is now bent in the opposite direction, replace the barrel.

(h) If the gage passes freely through the barrel, the barrel shall be considered straight and continue in service.

(i) If the barrel has been straightened, the rifle must be targeted (p 3-39).

d. REASSEMBLY

1



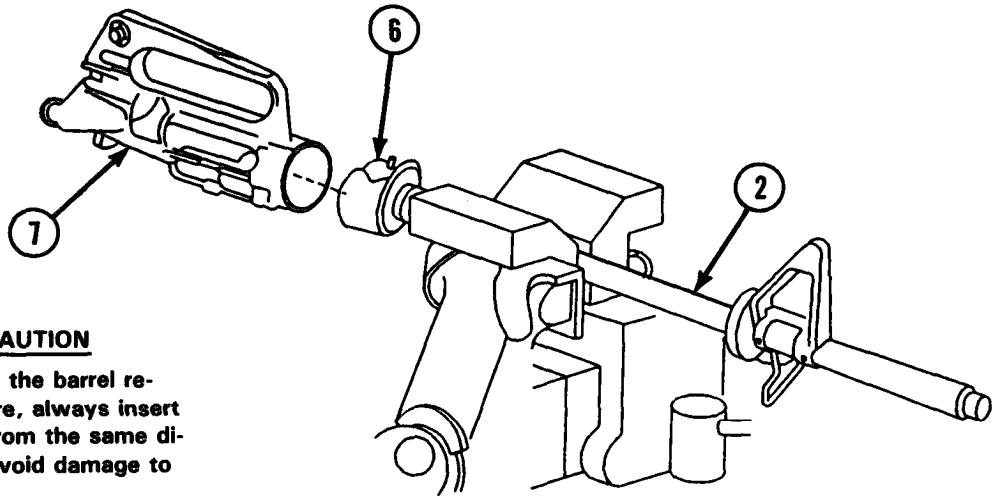
(a) Position barrel nut (1) by sliding it to the rear of barrel assembly (2) as far as possible.

(b) Slide handguard slip ring (3) over barrel nut (1).

(c) Press slip ring spring (4) from both sides and insert it into handguard slip ring (3).

(d) Install retaining ring (5) against slip ring spring (4) using retaining ring pliers. Snap retaining ring (5) to barrel nut (l).

2



CAUTION

When using the barrel removal fixture, always insert the barrel from the same direction to avoid damage to the fixture.

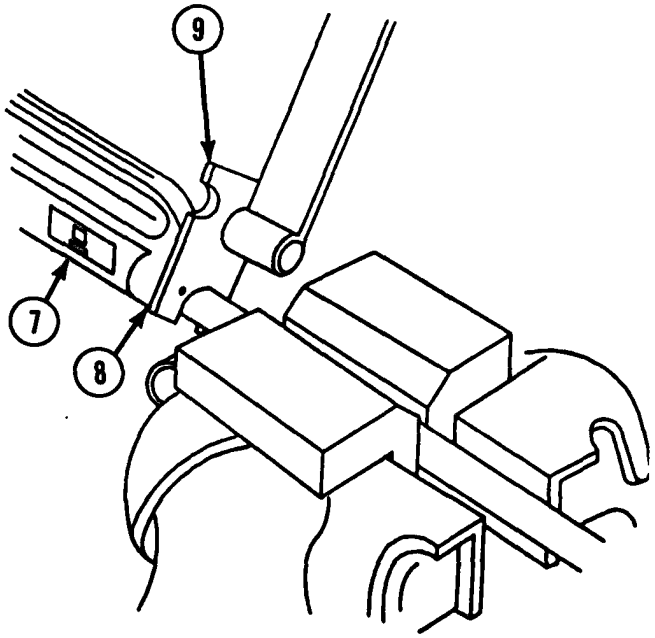
NOTE

Wipe upper receiver thread clean and ensure there are no burrs. Apply molybdenum disulfide grease to the threads before installation. This operation must be done in order to make later removal of the barrel easier.

(a) Position rifle barrel assembly (2) with alignment pin (6) up. Using barrel removal fixture, clamp barrel assembly (2) in vise.

(b) Align upper receiver assembly (7) using barrel alignment pin (6) and the slot in upper receiver assembly (7). Install over end of barrel assembly (2).

3



(a) Engage threads of barrel nut assembly (8) with upper receiver assembly (7).

(b) Using combination wrench (9) and torque wrench, torque barrel nut assembly (8) to 30 ft-lb. Torque is measured when both wrenches are used together.

NOTE

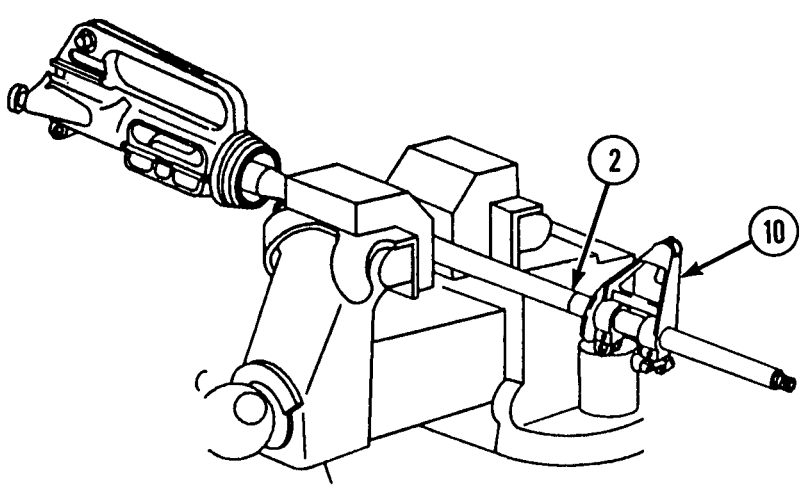
Two time torquing (three times total) procedures provide for a better thread fit and prevents barrel nuts from becoming loose. Do not use the torque wrench for loosening.

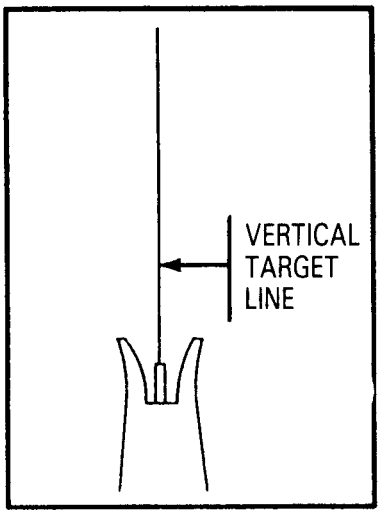
[c) Make certain all three drive pins on combination wrench are engaged with barrel nut assembly (8). Loosen and repeat torque operation. Then loosen the barrel nut again.

3-13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

d. REASSEMBLY (CONT)

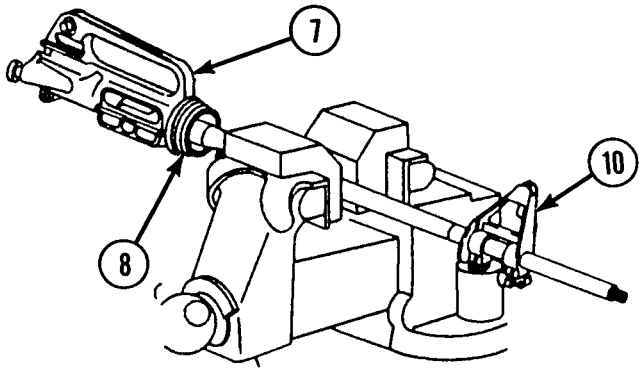
4

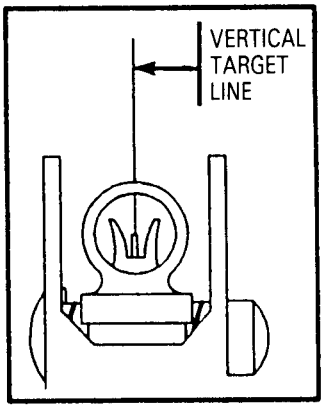




Loosen the vise and align the front sight assembly base (10) in a vertical position (use a vertical line on the wall to check this) then tighten vise to hold t-he barrel assembly (2) in that position.

5





NOTE

Upper receiver and barrel assembly may be equipped with low light level front and rear sights. The low light level front sight must be removed, shipped in its original container and reinstalled at unit maintenance.

(a) **With front sight assembly base (1 O) centered, view from the rear and rotate the upper receiver (7 right or left to align rear sight to the same vertical line as front sight.**

NOTE

Do not attempt to hold the upper receiver (7) with a pry bar; however, if the barrel assembly **(2)** turns in the holding fixture, a pry bar may be used in the front sight assembly base (10) to **help prevent the barrel from turning in the holding fixture.** Use care not to **distort or bend front sight or retaining pins.**

(b) Torque the barrel nut assembly again to 30 ft-lb while maintaining sight alignment. The barrel nut may be tightened beyond 30 ft-lb to align the barrel nut serrations for gas tube clearance. Never loosen the barrel nut assembly (8) to align for gas tube clearance.

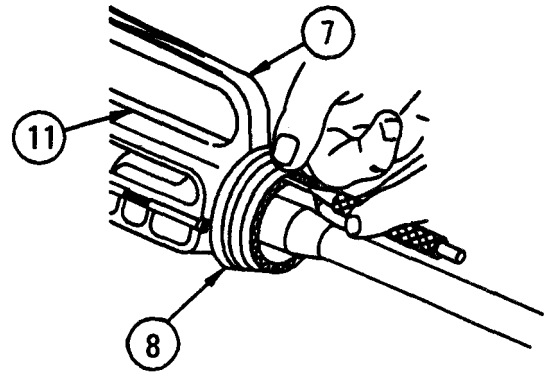
6

CAUTION

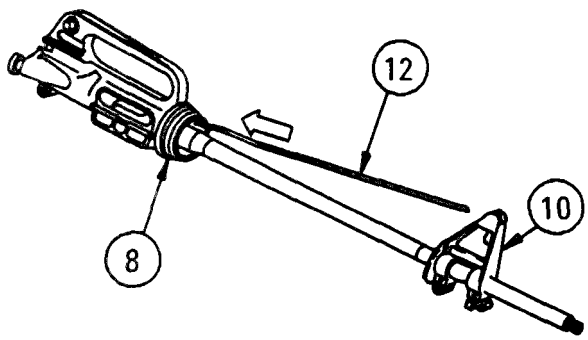
Do not torque over 80 ft-lb while tightening the barrel nut to next hole, to allow for proper alignment.

(a) Align barrel nut assembly (8) with hole in the upper receiver assembly (7) using 1/8 inch drive pin punch. If necessary, tighten nut to next hole to allow proper alignment.

(b) Remove drive pin punch from upper receiver and barrel assembly (11). Remove upper receiver and barrel assembly (1 1) from barrel remover fixture and vise.

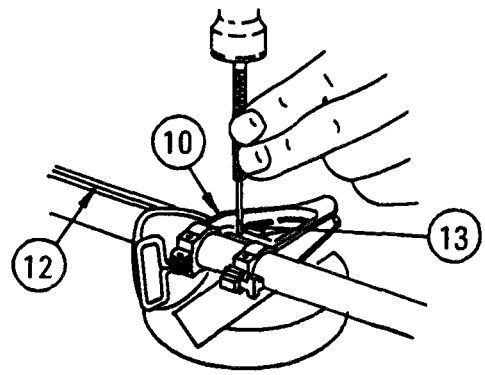


7



Slide gas tube (12) through the barrel nut assembly (8) and then slide forward inserting gas tube into hole in the front sight assembly base (10).

8



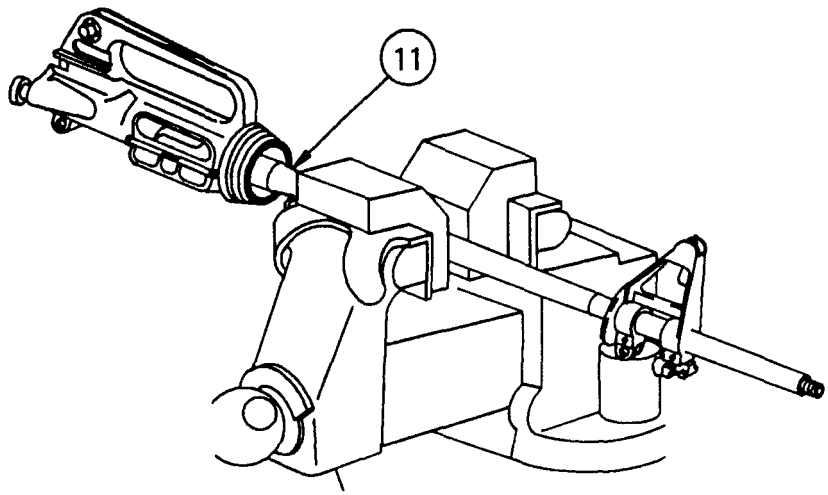
(a) Align the holes in gas tube (12) and front sight assembly base (1 O).

(b) Using ball peen hammer and 5/64-inch diameter drive pin punch, drive spring pin (13) into front sight assembly base (10) to secure gas tube (12).

3-13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

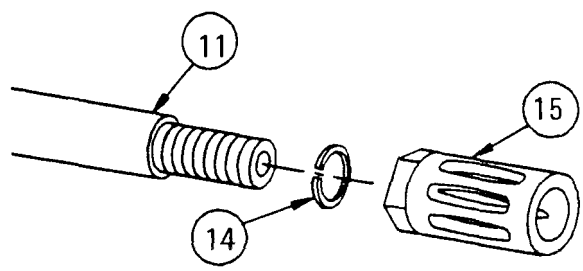
d. REASSEMBLY (CONT)

9



CAUTION

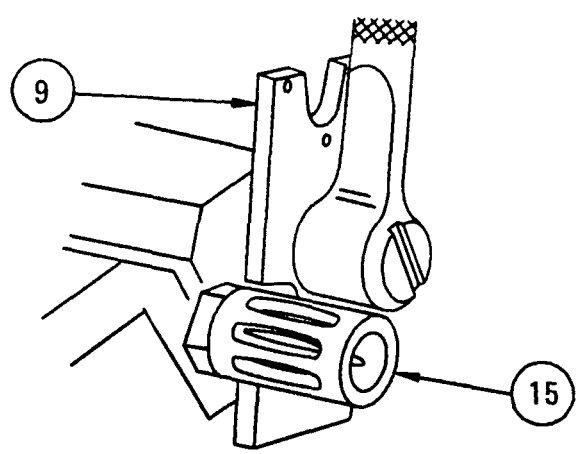
When using the barrel removal fixture, always insert the barrel from the same direction to avoid damage to the fixture.



(a) Install upper receiver and barrel assembly (11) into barrel removal fixture and vise.

(b) Install lockwasher (14) and closed end flash suppresser (15) on upper receiver and barrel assembly (1 1).

10



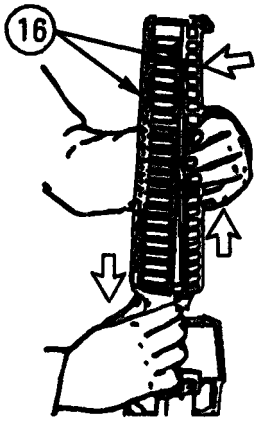
Torque flash suppressor (15) to 15-20 ft-lb using combination wrench (9) and torque wrench. Torque is measured when both wrenches are used together.

11

NOTE

Refer to Operator's Manual for "buddy system" procedures for installing handguards.

Install upper and lower handguards (16).



e. TEST

1 Determine the type of bore and chamber to be gaged.

NOTE

The following is the way to identify chromed barrels from unchromed barrels. Stampings on the barrel approximately one inch rearward from the flash suppressor are as follows

(a) (SAK MP C) SAK is the manufacturer's stamp, MP indicates magnetic partical inspection, C indicates chrome chamber only, or (C MP C) C = Colt Manufacturer, MP = magnetic partical inspection, and C = chrome chamber only.
(b) Other markings which indicate chrome chamber only are "C" alone or "RUC" or "RNC" alone. A "C" stamped on the barrel between the rings of the front sight base also indicates chromed chamber only.
(c) Markings the same as in (a) above with the last letter "B" indicate a fully chromed bore and chamber.
(d) Other markings such as "CB" alone indicate a fully chromed chamber and bore.
(e) The latest configuration is identified with the words "Chrome Bore" written out.
(f) Barrel that does not meet the above criteria is non-chrome.

2

NOTE

To insure proper operation of the gages, the barrel must be clean prior to performing the tests.

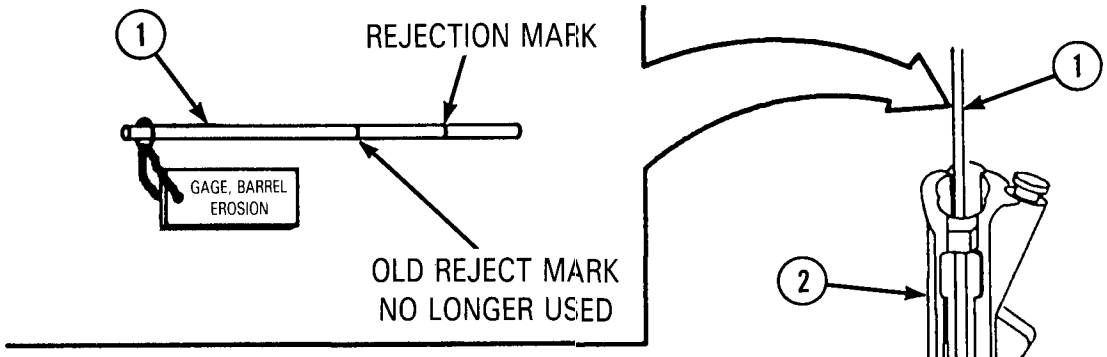
The following information pertains to the gages required for the upper receiver and barrel assembly.

(a) Barrel erosion gage, P/N 7799792, is to be used to check barrels that are not chromed. Instructions for its use are on the tag attached to the gage. The first line from the end of the gage is the reject line. The second line is no longer used.
(b) Barrel erosion gage, P/N 8448496, is to be used only on fully chromed barrels. Instructions for its use are on the tag attached to the gage.
(c) The muzzle erosion gage, P/N 8446677, is used on the unchromed barrel only. It is not required for use on chromed bore barrels. Instructions on its use are on the tag attached to the gage.
(d) The bore straightness gage, P/N 8448202, is required for use on all barrels. The gage must pass through the barrel without force.

3- 13. UPPER RECEIVER AND BARREL ASSEMBLY (CONT).

e. TEST (CONT)

3



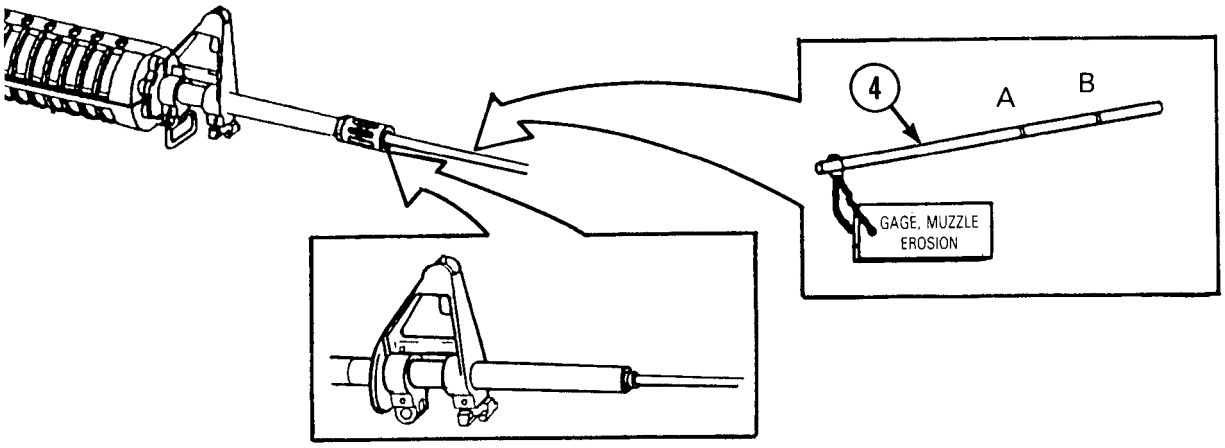
(a) To check erosion in an UNCHROMED barrel only, insert barrel erosion gage (1) PN 7799792 into breech end of upper receiver (2).

(b) Gage must not go beyond rejection mark when viewed from front edge of magazine well (3) in upper receiver (2).

NOTE

If barrel erosion gage goes past the rejection mark, the barrel is unserviceable.

4



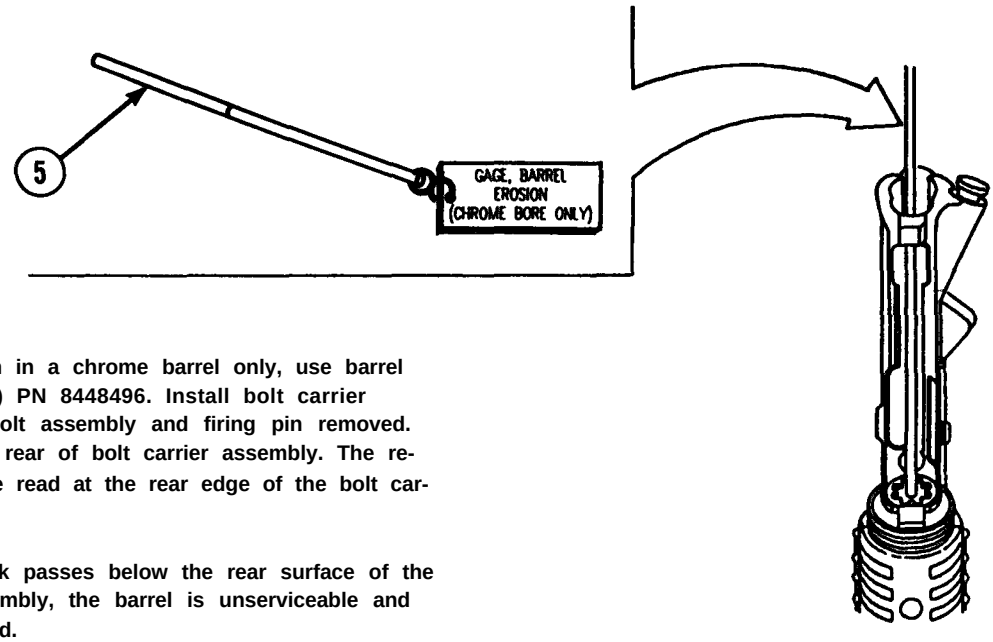
(a) To check muzzle erosion in an unchromed barrel only, insert muzzle erosion gage (4), PN 8448677, into muzzle. Do not check muzzle erosion on chrome barrels.

(b) Gage must not go beyond applicable rejection mark or the barrel is unserviceable.

NOTE

There are two rejection marks, "A" and "B". Use rejection mark "A" when the barrel is being gaged without the flash suppressor assembled. Use rejection mark "B" when the barrel is being gaged with the flash suppressor installed.

5



(a) To check erosion in a chrome barrel only, use barrel erosion gage (5) PN 8448496. Install bolt carrier assembly with bolt assembly and firing pin removed. Insert gage into rear of bolt carrier assembly. The reject line must be read at the rear edge of the bolt carrier assembly.

(b) If the reject mark passes below the rear surface of the bolt carrier assembly, the barrel is unserviceable and must be replaced.

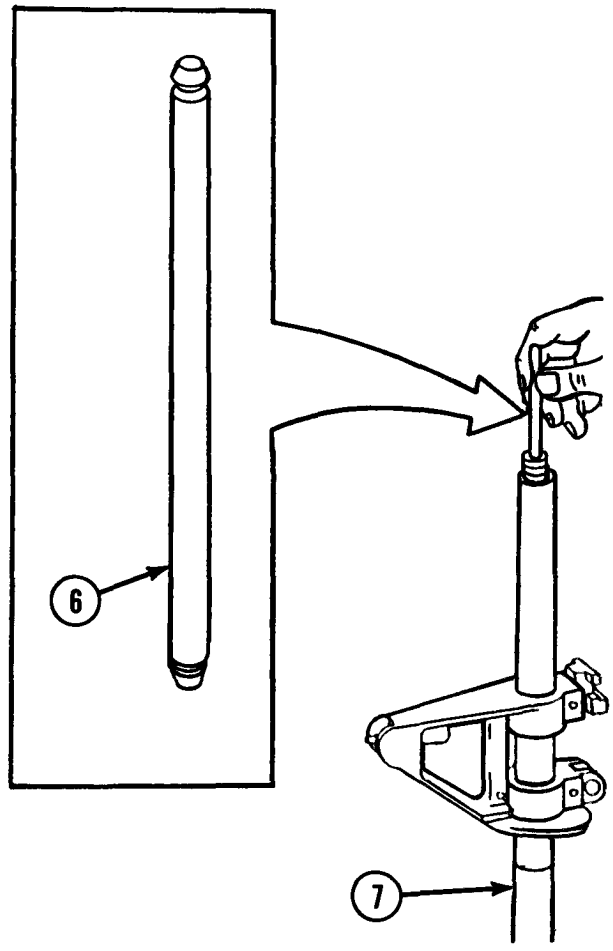
6

NOTE

Ensure barrel is clean prior to performing the following test.

(a) Check straightness of a chromed or unchromed barrel using straightness gage (6) PN 8448202. Put gage in barrel. Tilt barrel and allow gage to fall through. Catch gage.

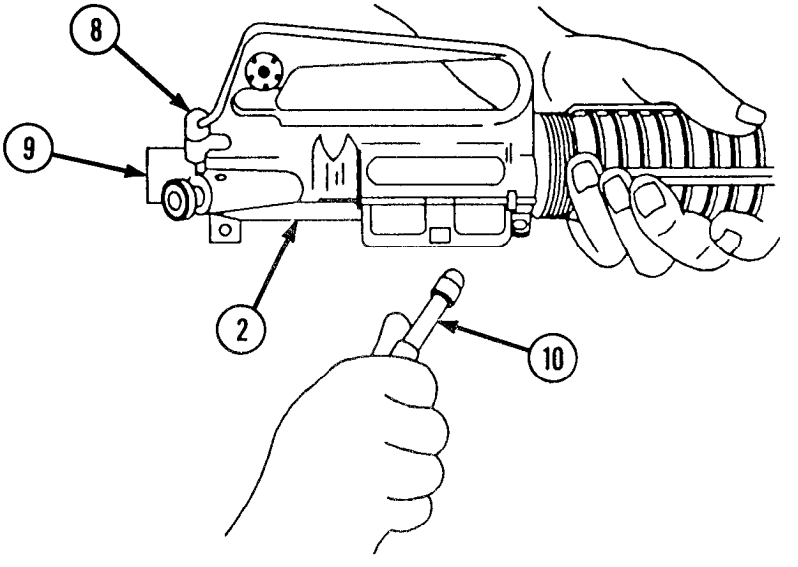
(b) Gage must pass freely through barrel. If the gage does not pass through the barrel, recheck as follows: Hold the upper receiver and barrel assembly (7) in a vertical position with the muzzle pointed down; insert gage into chamber end of barrel. Release gage and catch it as it exits the muzzle end. If the gage passes freely through the barrel, the barrel is acceptable. If it does not, the barrel must be straightened or replaced. (See p 3-29 for straighten instructions/procedures).



3-13. UPPER RECEIVER AND BARREL **ASSEMBLY (CONT).**

e. TEST (CONT)

7



(a) Install charging handle (8), and bolt **carrier assembly (9) into upper receiver (2).**

(b) Insert headspace gage (10) PN **7799734 in chamber.**

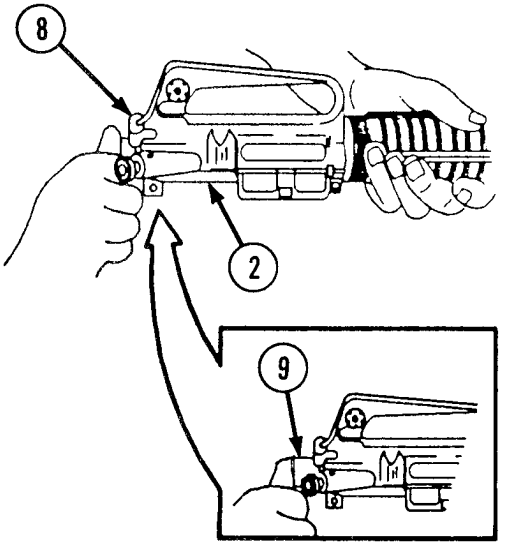
8

NOTE

For the purpose of this test "light finger pressure" is defined as 8 1/2 to 8 3/4 pounds.

(a) **Check headspace by pressing bolt carrier assembly (9) and charging handle (8) forward using light finger pressure.**

(b) Bolt carrier assembly (9) must protrude from rear of receiver (2) for proper headspace. If bolt carrier assembly is flush with or indented to rear surface, this indicates excessive headspace.



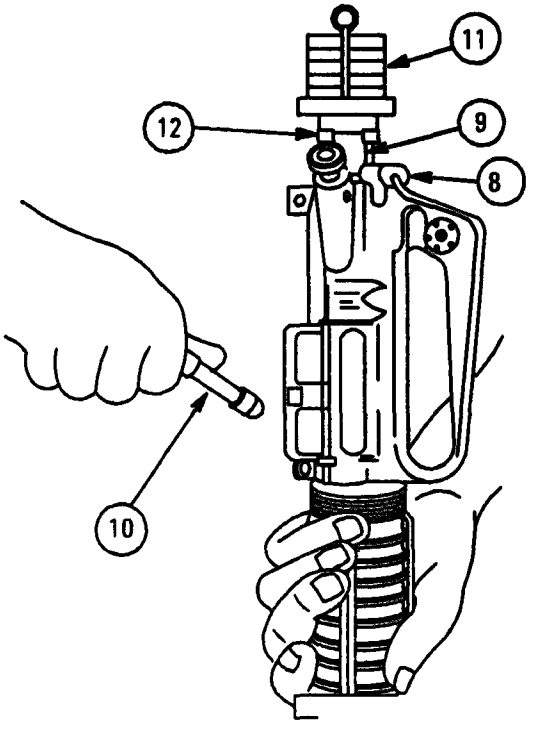
9

ARMY ONLY

(a) If the test fails using finger pressure, remove the gage and perform the test again as follows: With the muzzle down, stack 8 1/2 to 8 3/4 pounds of trigger weights (1 1) on a locally fabricated spacer/weight (12) on the bolt carrier assembly (9). Insert headspace gage (10) and test per above instructions.

(b) Remove trigger weights (11), spacer/weight (1 2), bolt carrier assembly (9), charging handle (8), and headspace gage (10).

(c) If excessive headspace, first replace bolt assembly and then recheck. if headspace is not corrected, replace barrel assembly; then recheck with the original bolt to determine if the bolt is still good or if the bolt should be replaced also.



NOTE

Rifles which have been rebarreled must be function-fired with seven rounds 5.56mm of ball ammunition. After rebarreling, the rifle must be targeted with three rounds 5.56mm of ball ammunition at 25 meter range. using target. Refer to TM 9-1005-249-10 and FM 23-9.

3-14. UPPER RECEIVER ASSEMBLY.

This task covers:

a. Disassembly
b. Inspection/Repair
c. Clean
d. Lubrication
e. Reassembly
f. Mechanical Zero Procedures (A. F. only)

INITIAL SETUP

Applicable Configuration
All M16/M16A1 rifles except as noted. The M 16 rifles are not equipped with the forward assist assembly. The receivers are different part numbers but all other parts are interchangeable. Only the M16A1 rifle is depicted. Some rifles may be equipped with a low light level rear sight.

Tools
Small Arms Repairman Tool Kit SC 5180-95-CL-A07
Field Maintenance Basic Less Power Small Arms Shop Set SC 4933-95-CL-A11 (1 9204)

Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Cloth, abrasive (item 12, app D)
Lubricant, solid film (item 19, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)

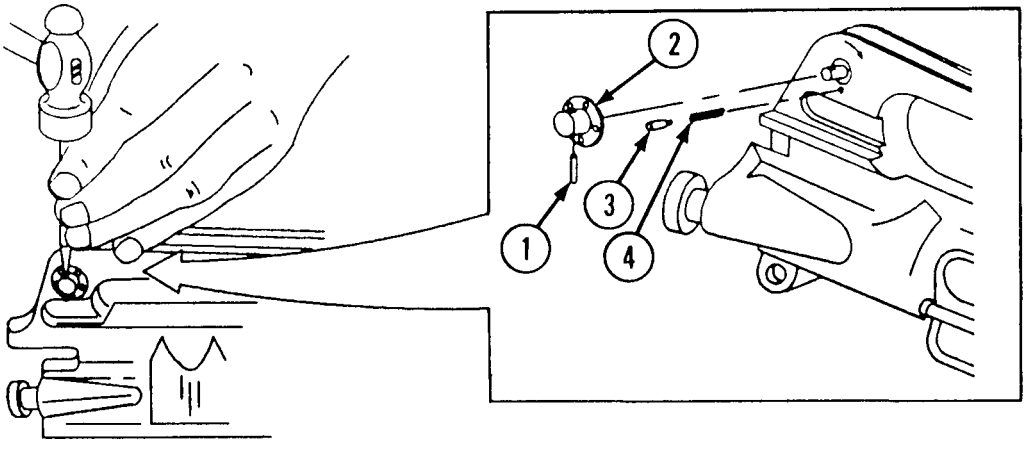
Equipment Condition

Page	Condition Description
3-23	Upper receiver removed

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts. When using solid film lubricant or dichloromethane, be sure the area is well ventilated.

a. DISASSEMBLY

1



WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

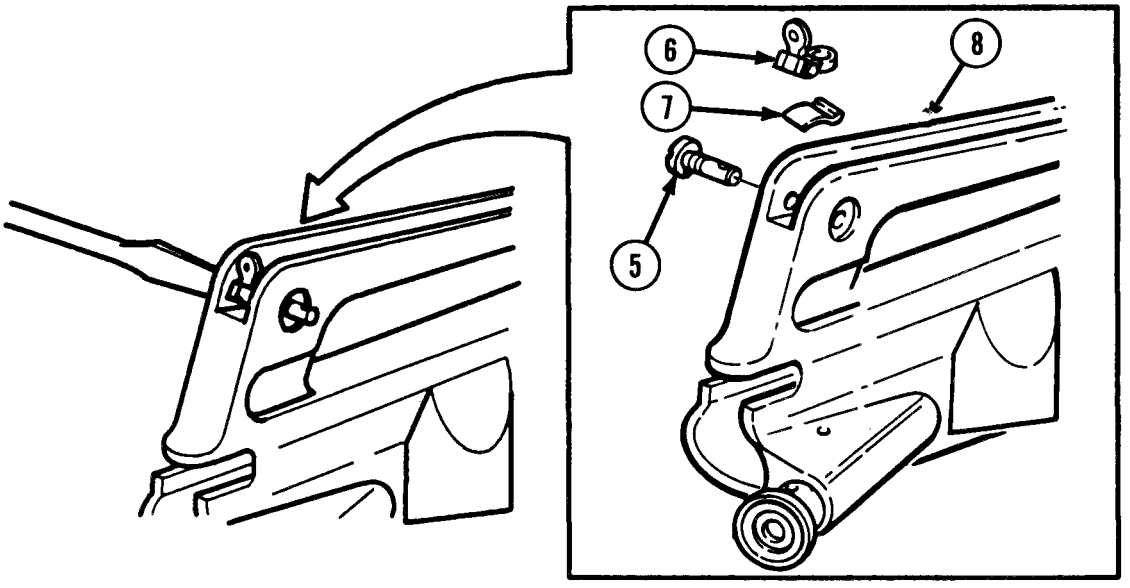
CAUTION

Be sure to catch small parts (1, 2, 3, and 4)

(a) Drive out spring pin (1) using a hammer and 1/16-inch punch.

(b) Catch rear sight windage drum (2), rear sight detent (3), and helical spring (4).

2



(a) Using a flat-bladed screwdriver, remove rear sight windage screw (5).

(b) **Remove aperture sight (6), flat spring (7), from upper receiver (8).**

NOTE

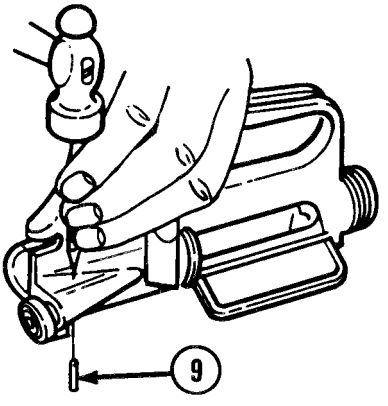
There is no further disassembly for **M 16** rifle upper receiver assembly. (M 16 does not have forward assist assembly.)

3

NOTE

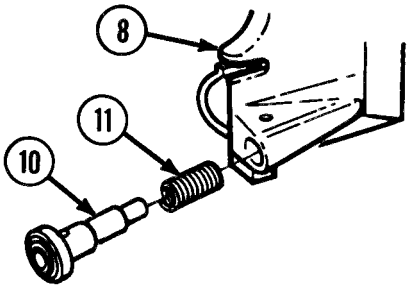
This applies to M16A1 Rifles only.

Drive out spring pin (9) using a 3/32-inch drive pin punch and hand hammer.



4

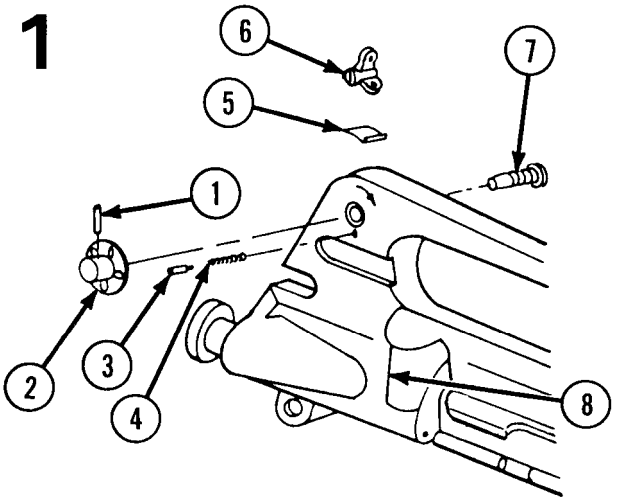
Remove forward assist assembly (10) and helical spring (11) from upper receiver (8).



3-14. UPPER RECEIVER ASSEMBLY (CONT).

b. inspection/REPAIR

1



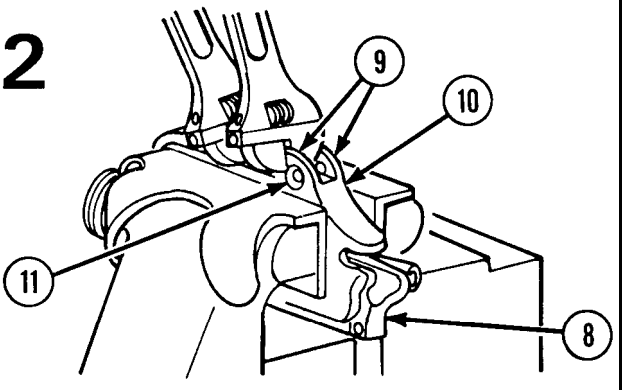
(a) Visually inspect rear sight parts (1 thru 7) for broken, bent, unserviceable condition or missing parts. Replace defective or missing parts.

b) Check helical spring (4) for serviceability, prior to disassembly and after reassembly. Replace if defective.

(c) Prior to disassembly and after reassembly, check that the flat spring (5) retains aperture sight (6) firmly in either position. Replace flat spring (5) if sight is not firm.

d) Check upper receiver (8) for cracks, corrosion, or mutilation. Repair or replace upper receiver if defective. Refer to page 3-26, inspection/ CLEANING.

2



(a) To straighten bent rear sight guards (9), remove rear sight components. Place carrying handle (10) in a vise with top edge of vise at a point just below the windage screw hole (1 1). Tighten vise (11) to firmly hold upper receiver (8).

(b) Using two eight-inch adjustable wrenches, gradually bend guards (9) to straighten. When bending the guards (9), gradually bend beyond the straight point, as the guard will partially return when bending pressure is stopped.

(c) After straightening, use a flat file to remove any nicks, kinks, or burrs that remain on the inside of guards (9).

CAUTION

Do not use wire brush on aluminum surfaces.

(d) Apply solid film lubricant to brightened area for final protective coating.

(e) Replace rear sight components and check that sight functions properly. If sight functions check out, return upper receiver to service.

3

(a) Inspect upper receiver for cracks, corrosion, mutilation, wear, or damage.

(1) Small dents or gouges that do not affect functioning will not be cause for rejection.

(2) If receiver contains cracks or holes, the receiver will be replaced.

(b) Inspect springs for breaks, deformation, and rust.

(c) Repair corroded upper receiver surfaces as follows:

(1) Sand corroded area with abrasive cloth and make sure all corrosion has been removed.

(2) Wash area with technical dichloromethane (methylenechloride) to remove all dirt, grease, and foreign material.

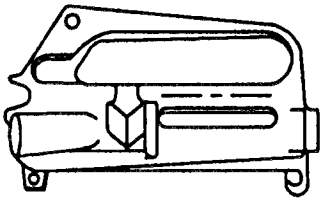
(3) Apply sealing compound, mixed in accordance with manufacturer's directions, to areas to be filled.

(4) Spread sealing compound as smoothly as possible into defective area using a putty knife or similar tool.

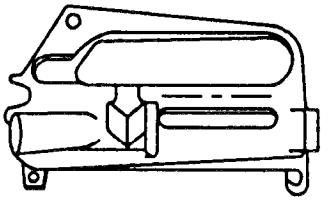
NOTE

Do not feather edges.

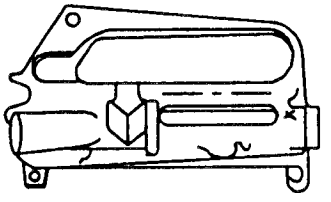
(5) Place a sheet of polyethylene, cut to size, over filled area. Rub by hand or smooth using small roller.



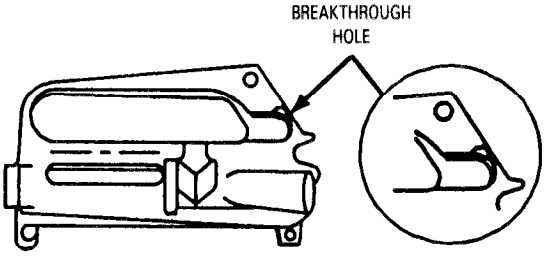
A - SHINY SURFACES
(REPARABLE)



B - CORRODED
(REPARABLE)



C - CORRODED
(NONREPARABLE)



D - BREAKTHROUGH HOLE
(ACCEPTABLE)

3-14. UPPER RECEIVER ASSEMBLY (CONT).

b. INSPECTION/REPAIR (CONT)

4

(a) After curing, remove polyethylene sheet in accordance with manufacturer's instructions.

WARNING

When using solid film lubricant or dichloromethane, be sure the area is well ventilated.

CAUTION

Solid film lubricant is to be used only as an exterior surface protective finish and touch up. If solid film lubricant comes in contact with recoiling parts or functional surfaces of the rifle, remove immediately by washing with technical dichloromethane.

(b) Wash area with technical dichloromethane (methylenechloride) to remove all dirt, grease, and foreign material.

(c) Roughen area to be refinished with abrasive cloth and clean surface again. Do not touch the area with fingers.

CAUTION

Do not use a wire brush on aluminum surfaces.

(d) Repair shiny surfaces by spraying a coat of solid film lubricant in accordance with manufacturer's Instructions. Dry 24 hours before handling

NOTE

Solid Film Lubricant (SFL) is the authorized touch up for the M16/M16A1 Rifle and may be used on up to one third of the exterior finish of the weapon.

FOR CONUS USE ONLY: Solid Film Lubricant may be used as a touch up without limitation on the upper receiver and barrel assembly. This is to say that units which DO NOT fall under the category of Divisional Combat Units or rapid deployment type units may have up to 100% of the exterior surface of the Upper Receiver and Barrel Assembly protected with SFL. Prior to application of SFL the surface must be thoroughly clean and inspected for corrosion and/or damage. If corroded or damaged, the part must be repaired prior to application of SFL, or replaced. Continued use under combat conditions would result in an unprotected surface when the SFL wears off. This would result in a large light reflecting surface and accelerated deterioration of the unprotected surface. Therefore, Divisional Combat Units and units which fall under the definition of Rapid Deployment type must adhere to the limitation of NOT over 1/3 of their exterior surface covered by SFL

(e) Inspect all parts for damage and wear. Replace all defective parts.

c. CLEAN

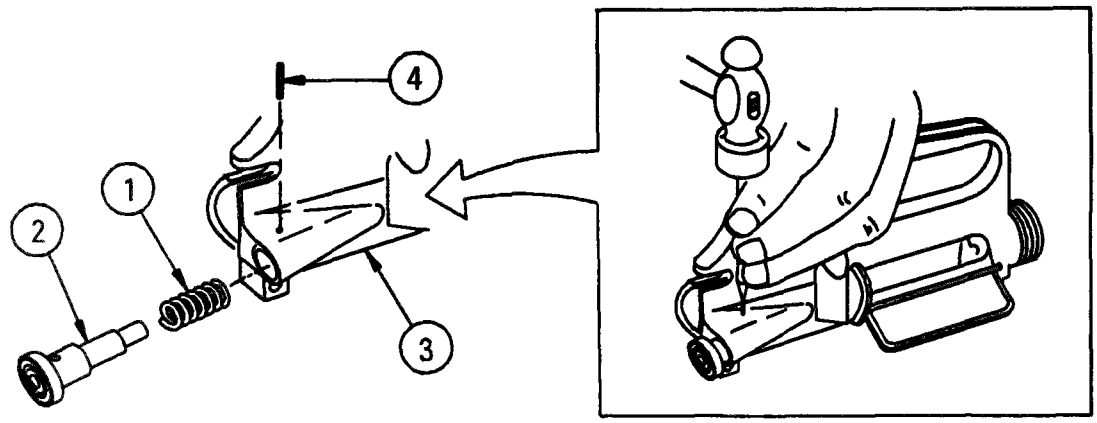
Clean rear sight and forward assist portions of upper receiver and all components.

d. LUBRICATION

Lubricate upper receiver assembly. Apply CLP, LSA, or LAW (see p 2-22) to helical springs, threaded portion of screws, forward assist and sight before installation.

e. REASSEMBLY

1



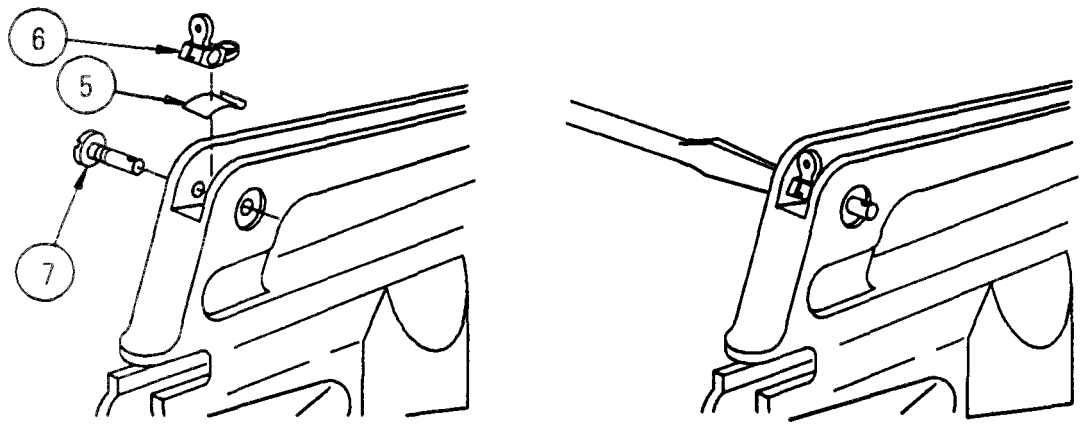
NOTE

M16A1 rifles only.

(a) Apply CLP LSA, or LAW (see p 2-22) to helical spring (1) and forward assist assembly (2) and install them into upper receiver assembly (3).

(b) Install spring pin (4) using 3/32-inch drive pin punch and hand hammer.

2



NOTE

All M16 rifles.

(a) Apply CLP, LSA or LAW **(see p 2-22) to flat spring (5), aperture sight (6), and threaded portion of rear sight** windage screw (7).

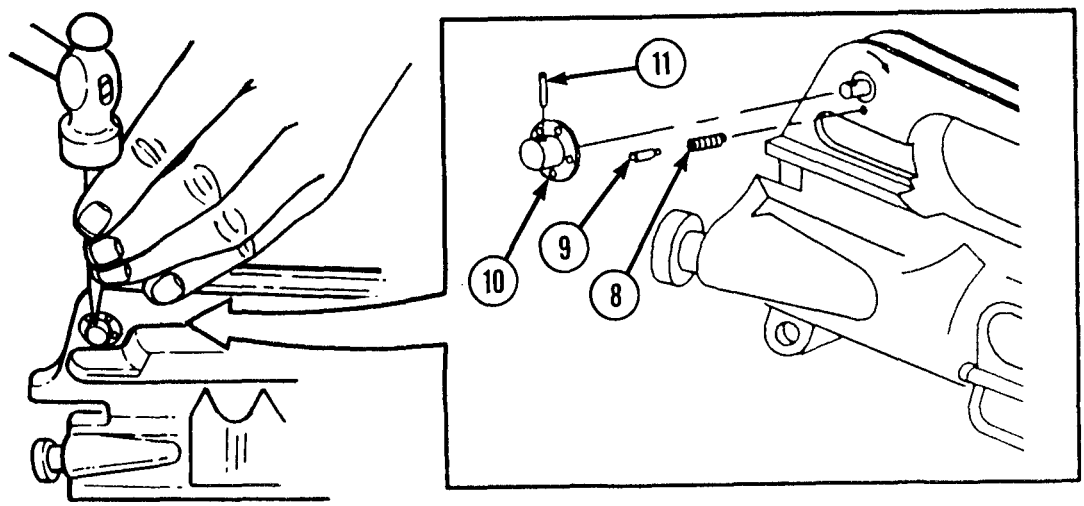
(b) install flat spring (5) and aperature sight (6) with letter "L" to rear.

(c) Install rear sight windage screw (7) using flat tip screwdriver. Tighten screw.

3-14. UPPER RECEIVER ASSEMBLY (CONT).

e. REASSEMBLY (CONT)

3



WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

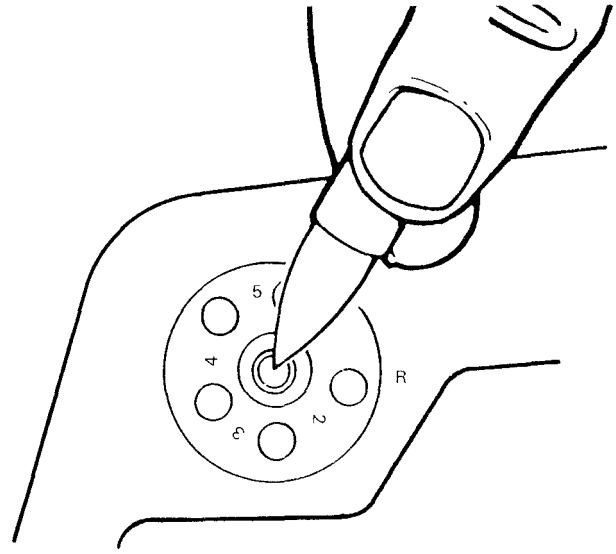
(a) Install helical spring (8), rear sight detent (9), and rear sight windage drum (10).

(b) **Secure by installing spring pin (1 1) using 1/16-inch drive pin punch and hand hammer.**

f. MECHANICAL ZERO PROCEDURES

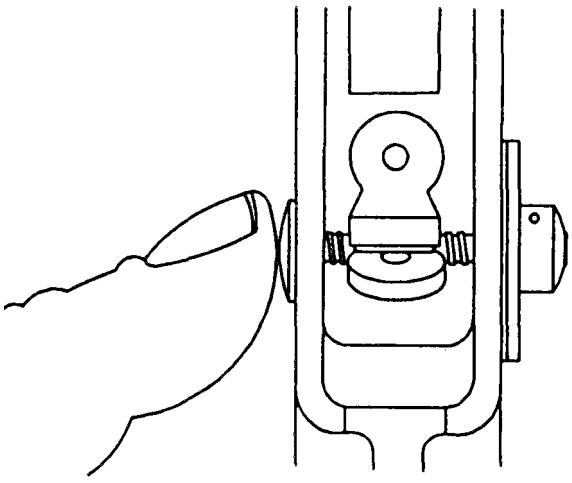
1

Center rear sight by moving rear sight drum in the appropriate direction.



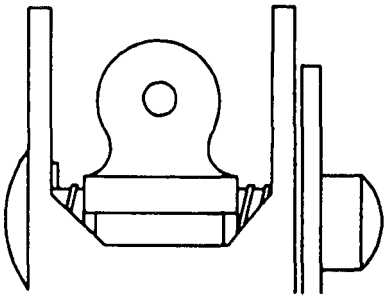
2

Always push in on bolthead after making rear sight adjustments.



3

Visually check rear sight to ensure it is centered after making adjustments. Also, ensure the rear sight is set in the short-range (unmarked aperture) position.



NOTE: Procedure will give an approximate battle site zero to most M 16 rifles. Once the above steps are completed, the rifle will be mechanically zeroed for 250 meters using the unmarked or short-range aperture and at 375 meters using the "L" or long-range aperture. The above steps can also be used before firing a new or newly assigned rifle. Use the procedure to check rifles stored in preferred packaging during routine inspections. This will help ensure people armed with the rifles will stand a better chance of hitting an enemy if the rifles must be used before a live fire zero can be made. Whenever possible, zeroing of the rifle should be accomplished using ball ammunition on a 25 meter zeroing target using the "L" aperture.

3-15. FORWARD ASSIST ASSEMBLY.

This task covers:

a. Disassembly
b. Inspection
c. Clean
d. Lubricate
e. Repair
f. Reassembly

INITIAL SETUP

Applicable Configuration
M16A1 rifle only

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)
Field Maintenance Basic Less Power Small Arms
Shop Set SC 4933-95-CL-A11 (19204

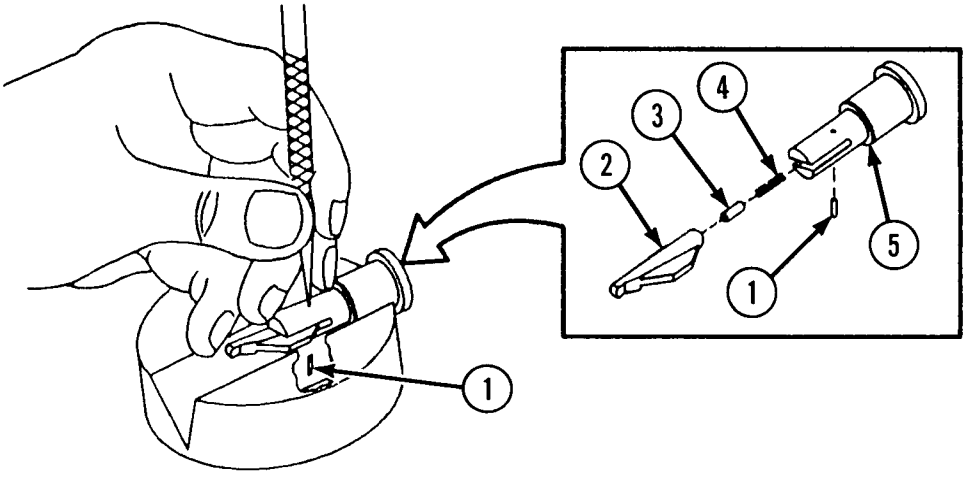
Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)

Equipment Condition
Page Condition Description
3-40 Forward assist assembly removed

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

3-15. FORWARD ASSIST ASSEMBLY (CONT).

a. DISASSEMBLY



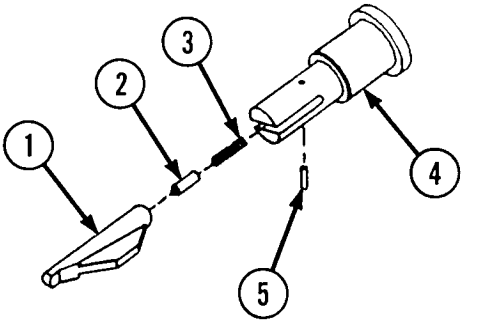
WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

1. **Drive out spring pin (1) using 1/16-inch drive pin punch and hammer.**
2. **Remove forward assist pawl (2), pawl detent (3), helical spring (4), from plunger assembly (5).**

b. INSPECTION

1. **Inspect forward assist pawl (1) for deformities, burrs, chips, and cracks. Minor burrs may be removed using fine files or stones, as required. Replace pawl if defective.**
2. **Inspect pawl detent (2) for deformities. Replace detent if defective.**
3. **Inspect helical spring (3) for kinks, breaks, and wear. Replace spring if defective.**
4. **Inspect plunger assembly (4) for wear, burrs, chips, and breaks. Minor burrs may be removed using fine files or stones, as required. Replace if plunger assembly is defective.**
5. **Inspect spring pin (5) for wear or deformities. Replace if defective.**



c. CLEAN

Clean all parts of the forward assist assembly.

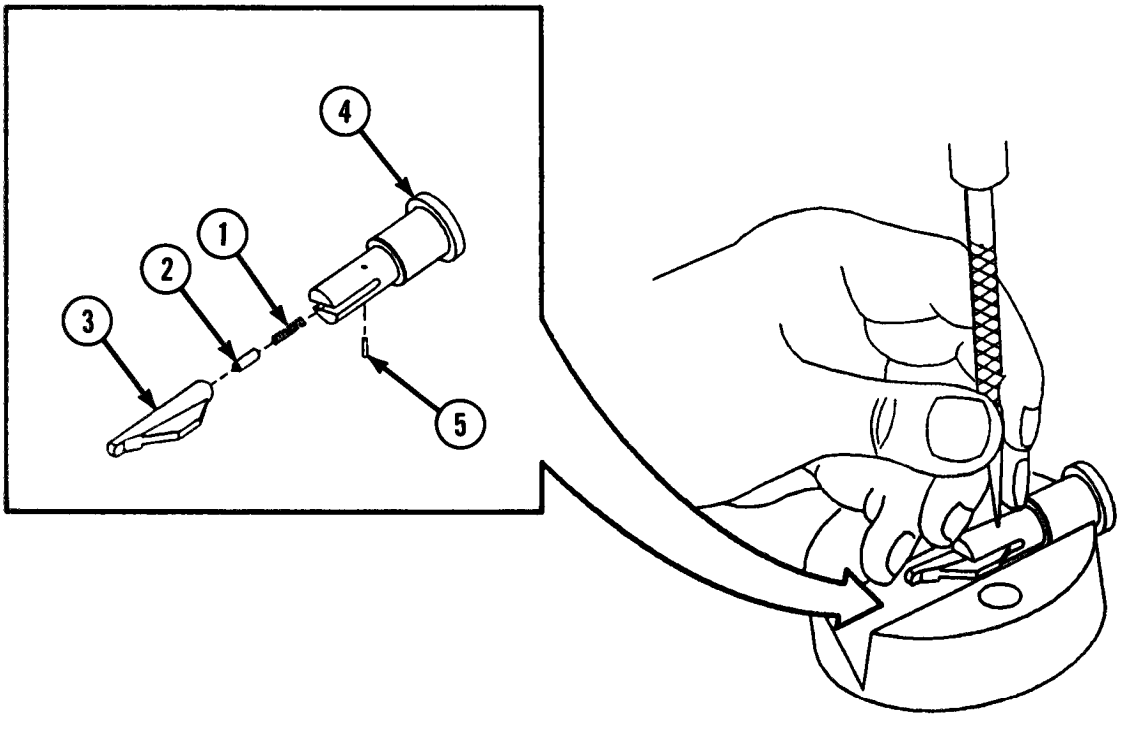
d. LUBRICATE

Lubricate helical spring, pawl detent, and forward assist pawl with CLP, LSA, or LAW (see p 2-22) before installation.

e. REPAIR

1. **Repair forward assist pawl using fine files or stones, as required, to smooth burrs. Do not deform forward assist pawl.**
2. **Repair plunger assembly using fine files or stones, as required, to smooth burrs. Do not deform plunger assembly.**
3. **Replace unrepairable parts.**

f. REASSEMBLY



WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

1. **Install helical spring (1), pawl detent (2), and forward assist pawl (3) into plunger assembly (4).**
2. **Align holes and install spring pin (5) using 1/16-inch drive pin punch and hammer.**

3-16. LOWER RECEIVER AND EXTENSION ASSEMBLY.

This task covers:

a. **Disassembly**
b. Inspection
c. Repair
d. Test
e. Clean
f. **Lubricate**
g. Reassembly

INITIAL SETUP

Applicable Configuration
All M 16/M16A1 rifles. All parts are the same except for lower receiver body which is different only in that it specifies the different models and the serial numbers.

Test **Equipment**
Tool and Gage Set 8426685 (1 9204)

Tools
Small Arms Repairman Tool Kit SC 5180-95-CL-A07 (19204)
Field Maintenance Basic Less Power Small Arms Shop Set SC 4933-95-CL-A11 (19204)
Pivot pin removing tool (locally fabricated tool) (fig E-2, app E)

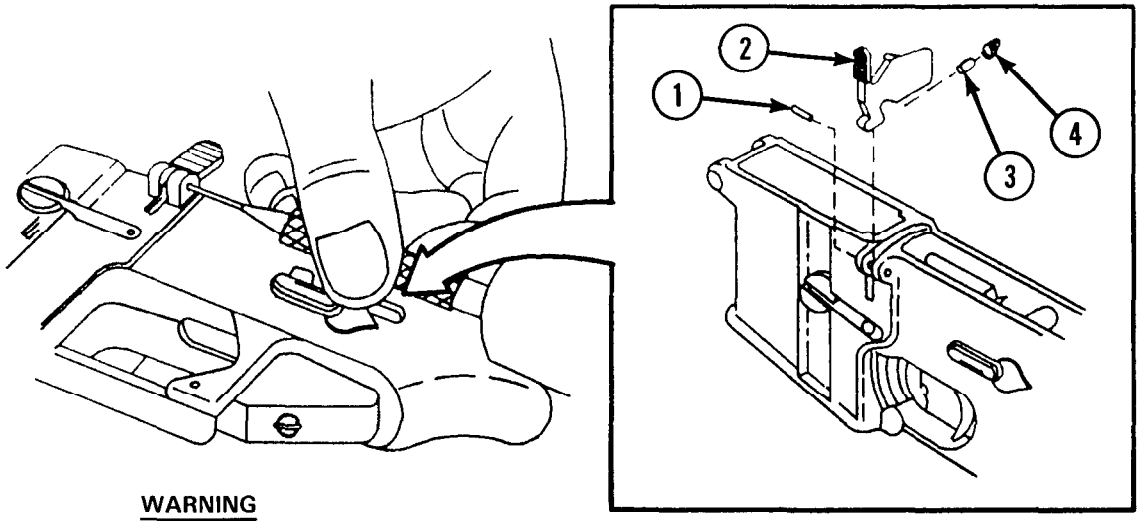
Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Cleaning compound, rifle bore (RBC) (item 11, app D)
Dichloromethane, technical (item 14, app D)
Lubricant, solid film (item 19, app D)
Lubricating oil, weapons (LAW) (item 20, app D)
Lubricating oil, weapons (LSA) (item 21, app D)
Screw, self-locking (butt-cap screw) (item 28, p C-10)

Equipment Condition
Page Condition Description
3-10 Lower receiver and extension assembly.

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.
When using solid film lubricant or dichloromethane, be sure the area is well ventilated.

a. DISASSEMBLY

1



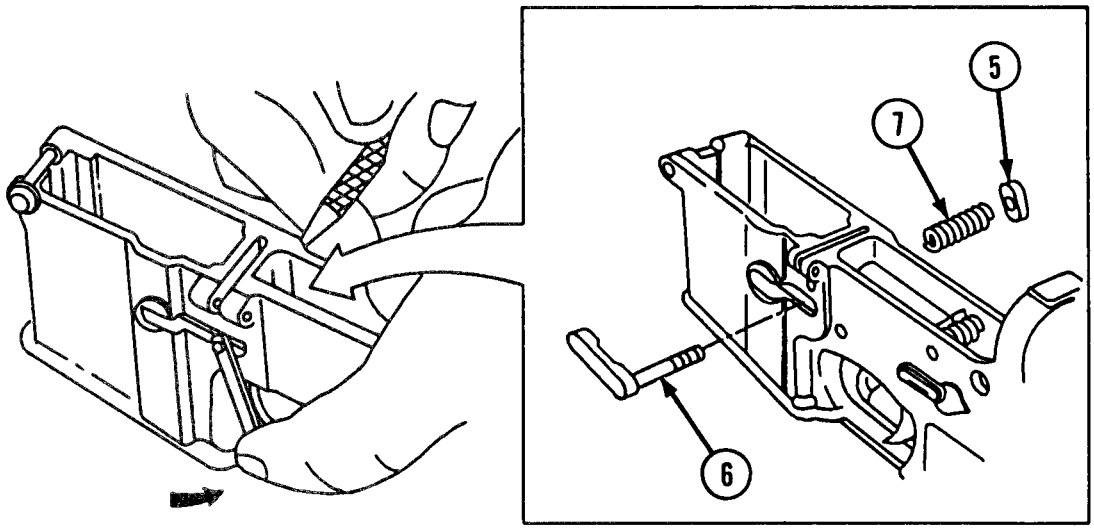
WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

(a) Remove spring pin (1) using 3/32-inch drive pin punch and hammer.

(b) Remove bolt catch (2), bolt catch plunger (3), and bolt catch spring (4).

2



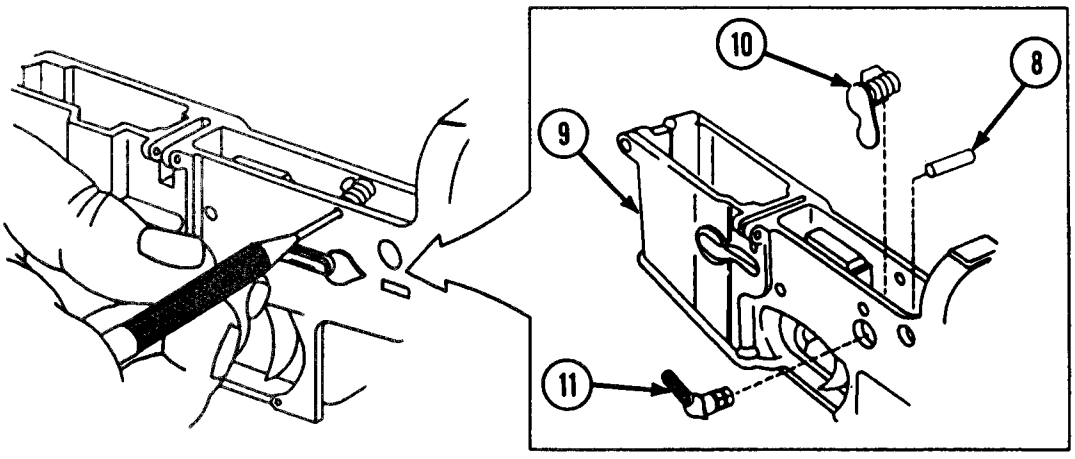
WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

(a) **Using drive pin punch, press in on magazine button (5) and turn magazine catch (6) counterclockwise to unscrew and remove.**

(b) **Remove magazine button (5) and magazine** catch spring (7)

3



(a) Use a drive pin punch to push automatic sear pin (8) out of lower receiver (9).

NOTE

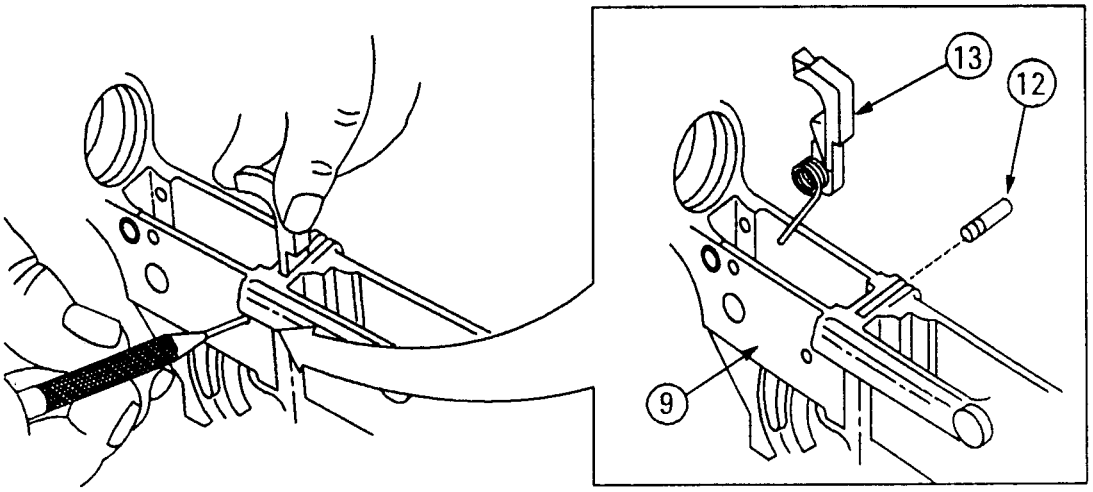
To remove sear, safety selector lever must be positioned to automatic (if installed).

(b) **Remove automatic sear (10) and safety selector lever (11).**

3-16. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT).

a. DISASSEMBLY (CONT)

4



WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

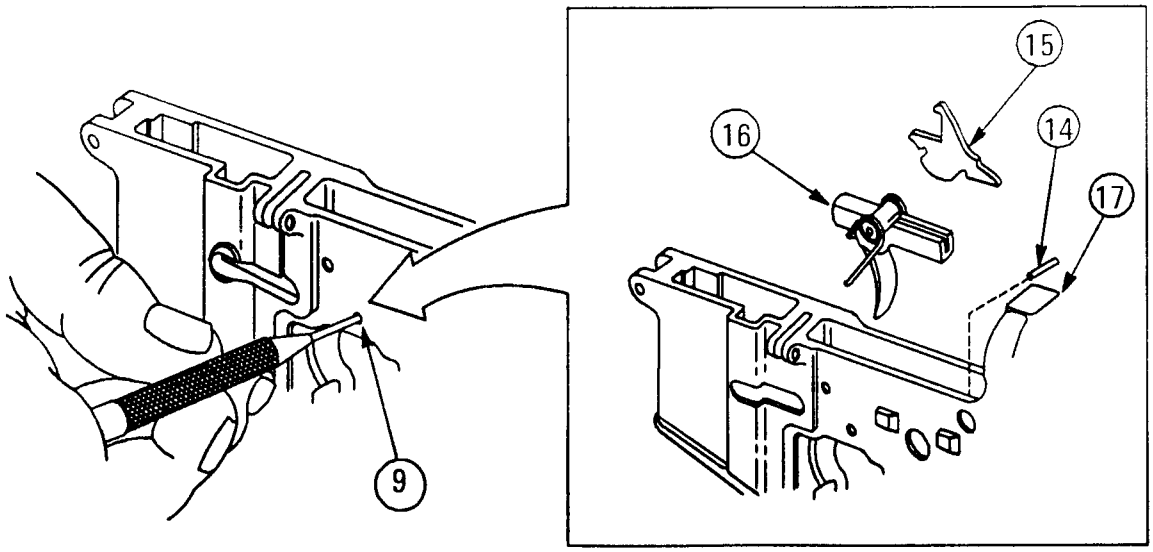
NOTE

To remove (hammer should be forward), place safety selector lever (if installed) to SEMI position.

(a) Use drive pin punch to push hammer pin (12) from lower receiver (9).

(b) Remove hammer assembly (13).

5

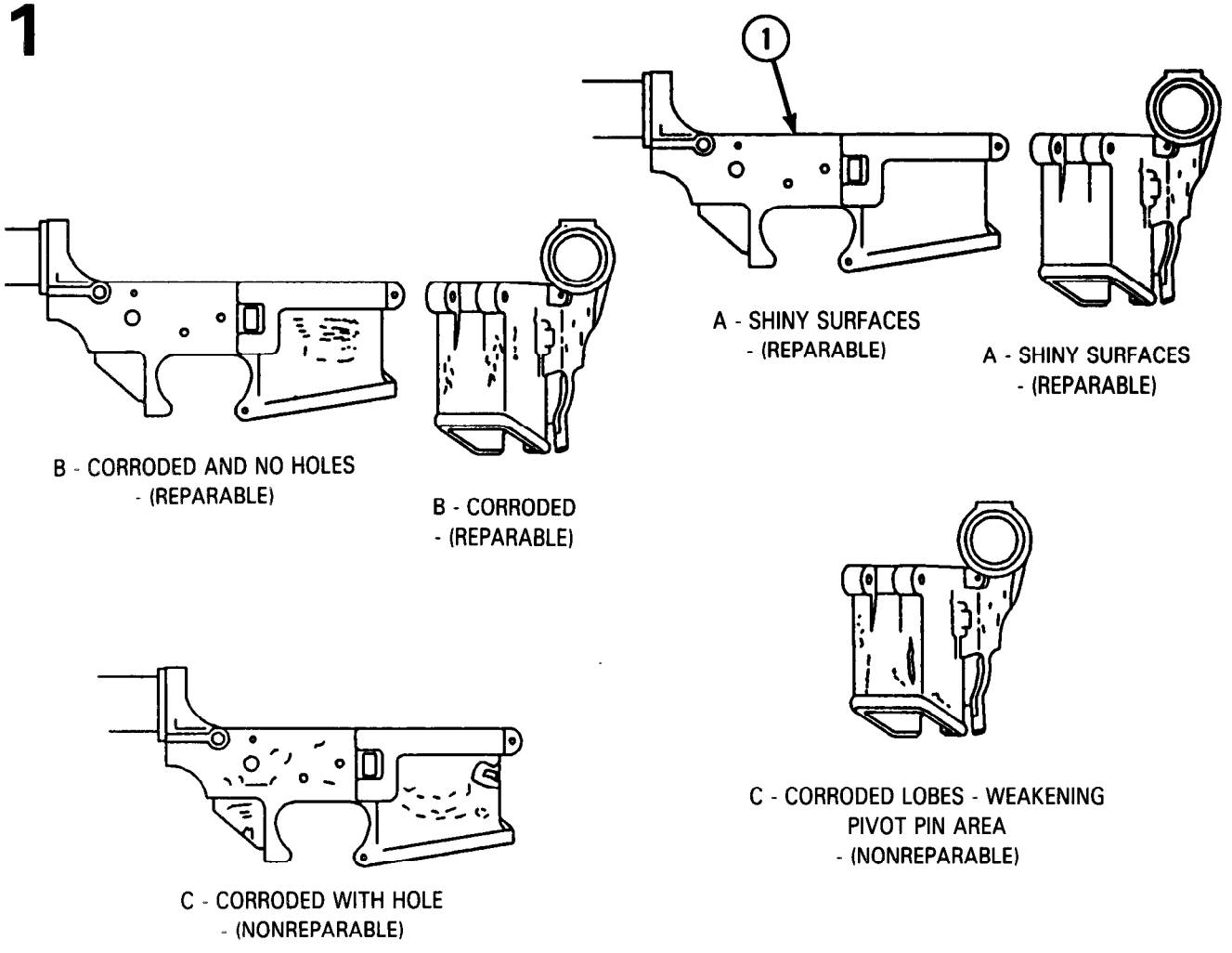


(a) Remove trigger pin (14) by pushing from the left side of lower receiver (9) with a drive pin punch.

(b) Remove disconnector (15) and trigger assembly (16) from lower receiver and extension subassembly (1 7).

b. INSPECTION

1



WARNING

When using solid film lubricant or dichloromethane, be sure the area is well ventilated.

CAUTION

Do not use a wire brush on aluminum surfaces.

NOTE

Apply solid film lubricant to shiny surfaces.

Solid Film Lubricant (SFL) is the authorized touch up for the M16/M16A1 Rifle and may be used on up to one third of the exterior finish of the weapon.

FOR CONUS USE ONLY: Solid Film Lubricant may be used as a touch up without limitation on the upper receiver and barrel assembly. This is to say that units which DO NOT fall under the category of Divisional Combat Units or rapid deployment type units may have up to 100% of the exterior surface of the Upper Receiver and Barrel Assembly

3-16. LOWER RECEIVER AND **EXTENSION ASSEMBLY (CONT).**

b. INSPECTION (CONT)

1 (CONT)

NOTE (CONT)

protected with SFL. Prior to application of SFL the surface must be thoroughly clean and inspected for corrosion and/or damage. If corroded or damaged, the part must be repaired or replaced prior to application of SFL. Continued use under combat conditions would result in an unprotected surface when the SFL wears off. This would result in a large light reflecting surface and accelerated deterioration of the unprotected surface. Therefore, Divisional Combat Units and units which fall under the definition of Rapid Deployment type must adhere to the limitation of NOT over 1/3 of their exterior surface covered by SFL.

If a M16/M16A1 Rifle LOWER RECEIVER is missing one third or more of its exterior protective finish, resulting in an unprotected/light reflecting surface, it is candidate for overhaul. This missing finish will be considered a shortcoming. This shortcoming requires action to obtain a replacement weapon. Once a replacement has been received, evacuate the original weapon to depot for overhaul.

Once the missing exterior protective finish of the lower receiver has exceeded one third of its total surface the probability of reclaiming the receiver during overhaul diminishes rapidly. In order to extend the life of the lower receiver, which is the serial numbered item, it is necessary to evacuate the weapon to depot once the missing finish reaches one third of the total surface of the receiver.

(a) **Inspect lower receiver and extension subassembly (1) for corrosion in the lower receiver lobes of the pivot area or hinge pin area.**

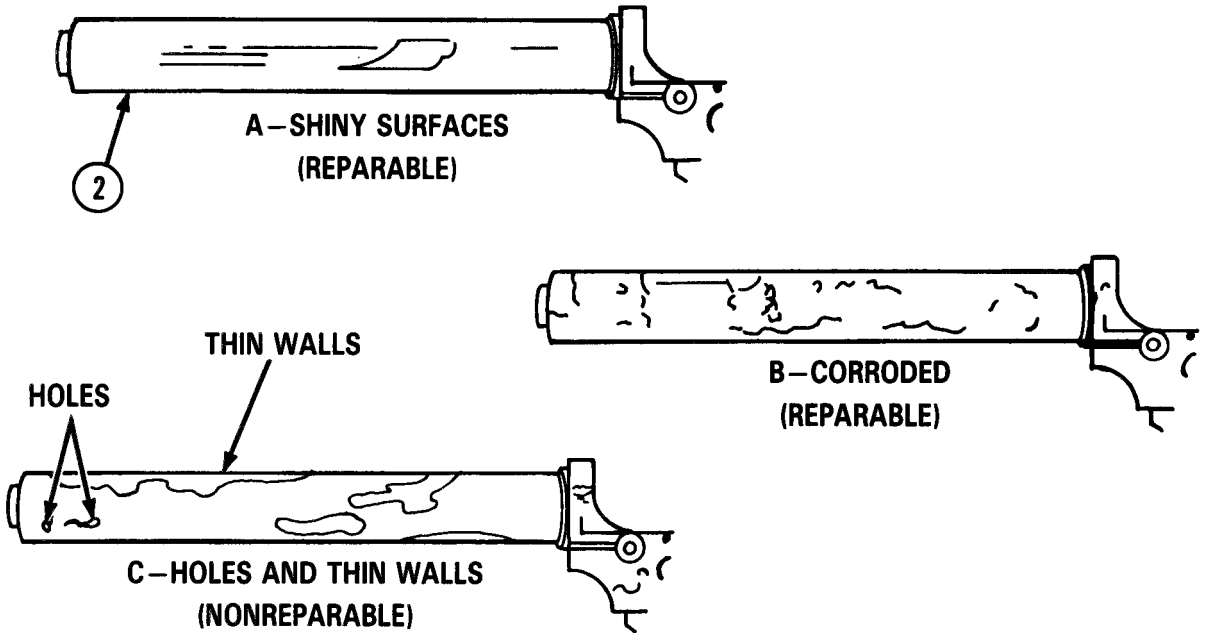
(b) **If extensive corrosion appears in these areas the receiver will not be repaired and rifle will be turned in for replacement.**

(c) **Inspect selector lever stops. If either is missing or damaged/worn to the point of being nonfunctional, the rifle will be turned in for replacement.**

NOTE

Refer to page 3-53, INSPECTION/CLEANING for repair procedures for corroded surfaces

2

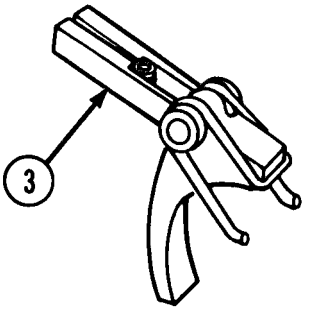


Inspect extension (2) portion of lower receiver and extension subassembly for corrosion. Repair or replace if defective.

NOTE

Refer to page 3-53, INSPECTION/CLEANING for repair procedures for corroded surfaces.

3



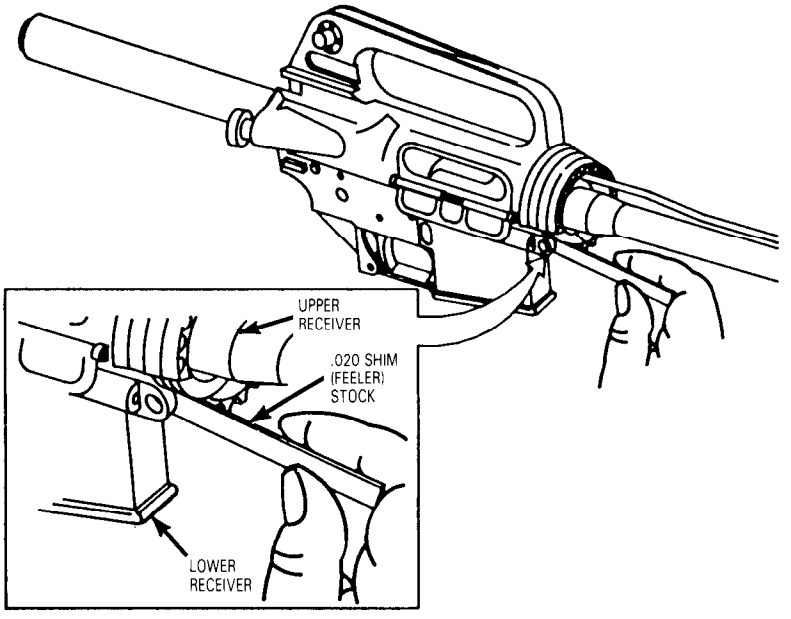
Inspect trigger assembly (3) for cracks or deformities. Inspect trigger for wear, cracks or deformities. Replace all defective components.

c. REPAIR

Repair or replace all parts of lower receiver and extension assembly if defective.

3-16. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT)

d. TEST



1. **With the upper receiver attached to the lower receiver, and the pivot pin and takedown pin in place, perform the following test:**

   (a) Apply hand pressure to push the upper receiver as far to one side as possible

   (b) Attempt to insert a .020" thickness gage between the pivot pin lugs of the upper and lower receivers

   (c) If the thickness gage penetrates to the pivot pin at all accessible locations, repair by replacement of the upper receiver (see para 2 below) or replacement of weapon is required.

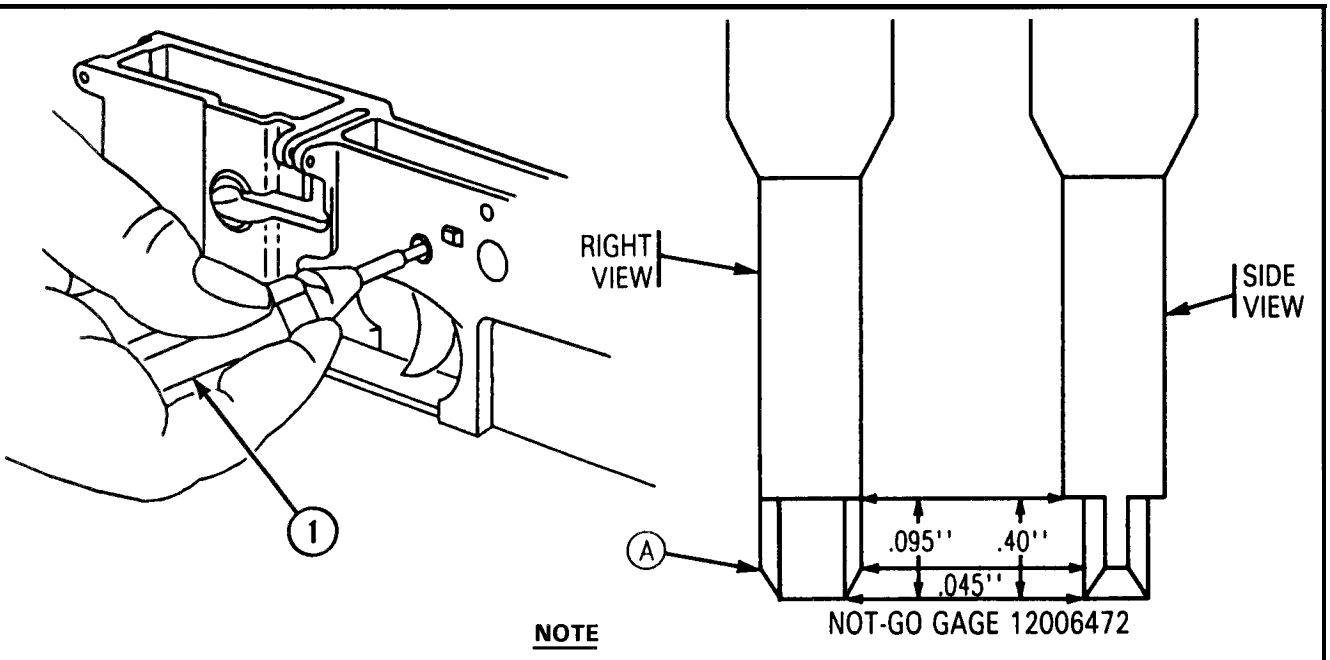
2. **If the rifle fails the above test, remove the upper receiver and install a "NEW" upper receiver and perform the test again.**

3. **If the rifle now passes the above test, it shall be considered serviceable and continue in use**

4. **If the rifle fails the test with a new upper receiver, this failure shall be considered a shortcoming. This shortcoming requires action to obtain a replacement weapon, Once a replacement has been received, evacuate the original weapon to depot for overhaul.**

NOTE

Failure of any portion of this test is considered a shortcoming until such time as a replacement weapon or repair parts are received.



NOTE

If the lower receiver is not disassembled, visually inspect for broken or damaged parts, and insure that the hammer and trigger springs are correctly installed before beginning this test. It is not necessary to disassemble the lower receiver for the sole purpose of this visual inspection. If broken or damaged parts are found, disassemble (p 3-50) and repair as authorized.

5. Test two hammer pin holes and two trigger pin holes using not-go plug gage (1) P/N 12006472. **This test may be conducted by disassembly of the lower receiver (p 3-50) or by pushing the pin far enough to disengage the end of the pin from the side of the receiver which is being tested. If the lower receiver is not disassembled and the not-go plug gage enters any hole to first shoulder (A) the lower receiver must be disassembled and all four holes must be tested again.**

6. Gently insert the not-go plug gage and rotate it 180 degrees. If the no-go plug gage passes through any of the four pin holes, the rifle is unserviceable and will be turned in for replacement. The gage must penetrate through the wall thickness to be unserviceable.

e. CLEAN

WARNING

When using technical dichloromethane, be sure the area is well ventilated.

Clean lower receiver and extension assembly with technical dichloromethane.

f. LUBRICATE

WARNING

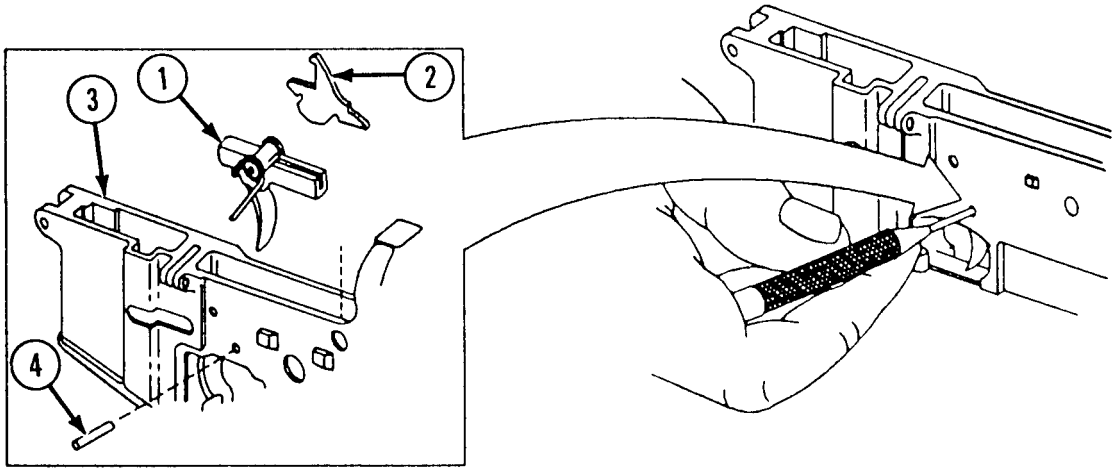
When using solid film lubricant be sure the area is well ventilated.

Lubricate all items **with CLP, LSA, or LAW (p 2-22) before reassembly.**

3-16. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT).

g. REASSEMBLY

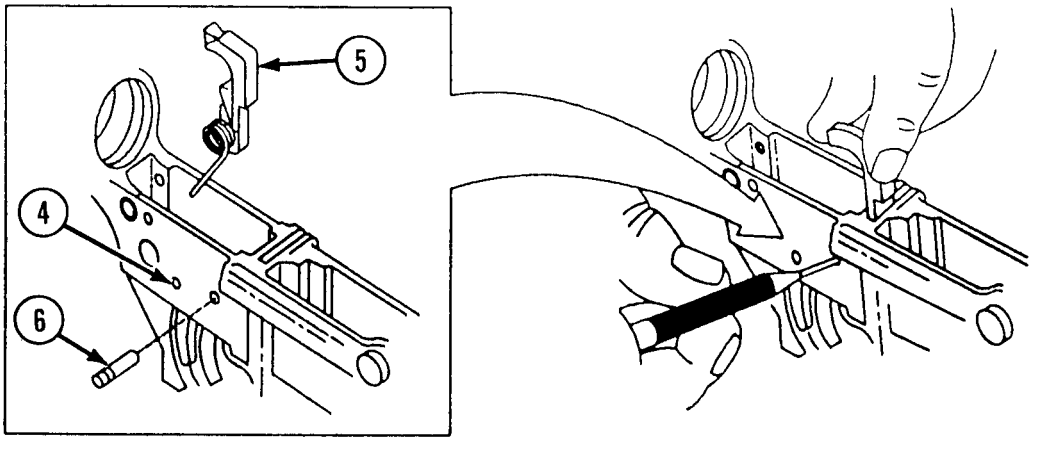
1



(a) Install trigger assembly (1) and disconnector (2) into lower receiver and extension subassembly (3).

(b) **Install trigger pin (4) using drive pin punch. Push in until flush.**

2



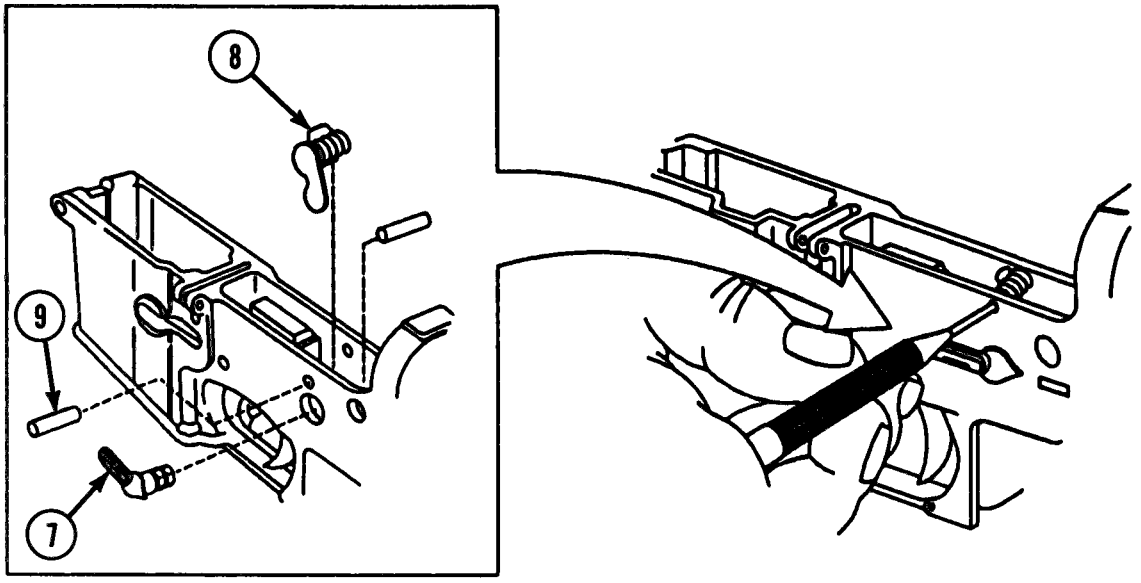
NOTE

Ends of hammer spring are installed to rear of trigger pin (4), resting in the annular groove on upper surface of trigger pin (4).

(a) Install hammer assembly (5).

(b) Install hammer pin (6) using drive pin punch. Push in until flush.

3



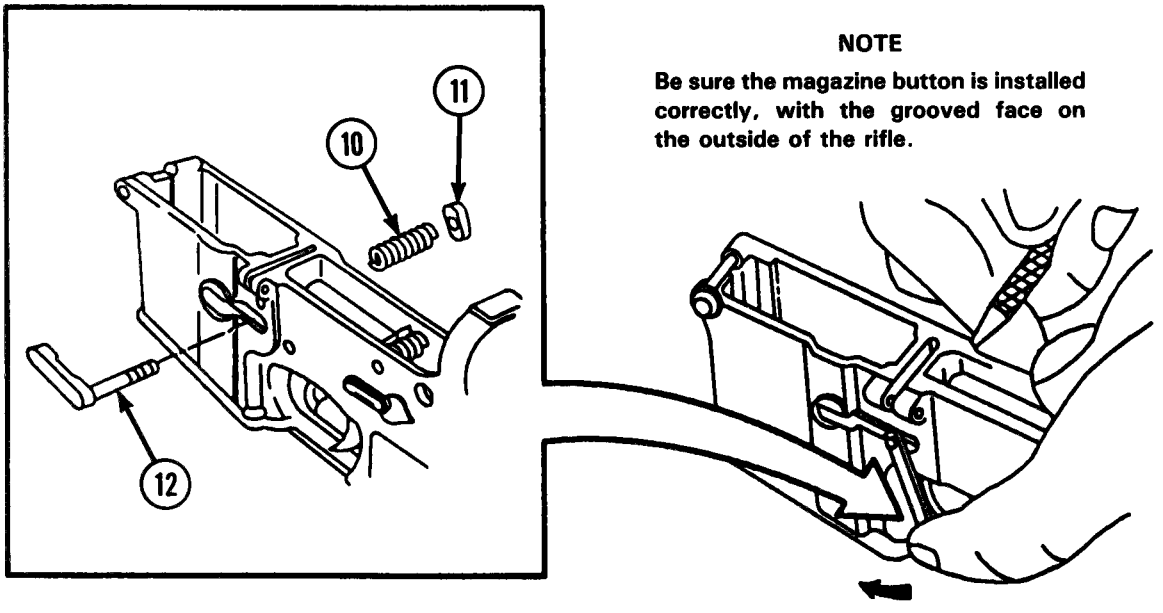
NOTE

Selector lever (7), if installed, must be positioned in automatic. Long leg of automatic sear (8) spring must rest on top of selector lever.

(a) Install **selector lever** (7) **and automatic sear (8).**

(b) install automatic sear pin (9) into receiver using drive pin punch. Push in until flush.

4



NOTE

Be sure the magazine button is installed correctly, with the grooved face on the outside of the rifle.

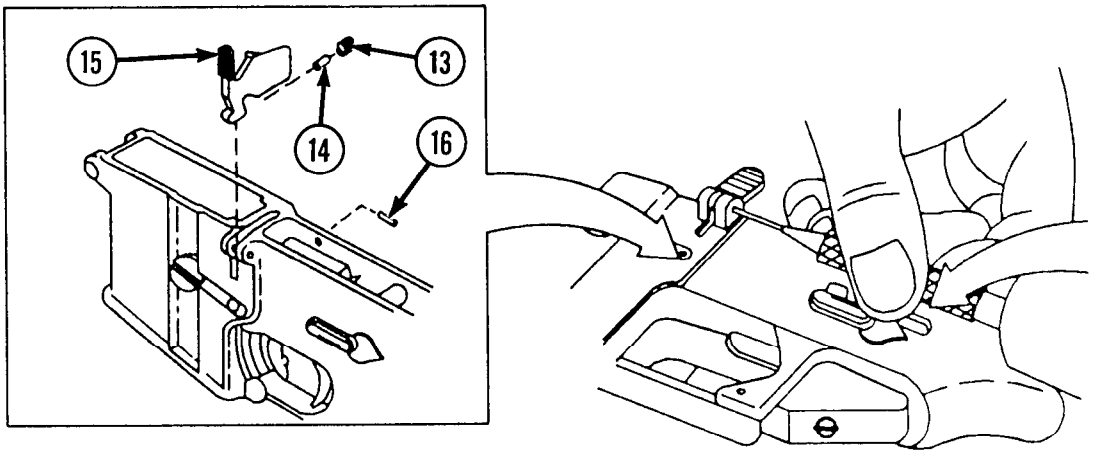
(a) Install magazine catch spring (10) and magazine button (11).

(b) Install magazine catch (12). Push in on magazine button (1 1) using a drive pin punch and turn magazine catch (12) clockwise until threaded end of catch is flush with magazine button head.

3-16. LOWER RECEIVER AND EXTENSION ASSEMBLY (CONT).

g. REASSEMBLY (CONT)

5



(a) **Install bolt catch spring (1 3), bolt catch plunger (14), and bolt catch (15).**

(b) Secure by installing spring pin (16) using 3/32-inch drive pin punch and hand hammer.

3-17. HAMMER ASSEMBLY.

This task covers:

a. Inspection
b. Repair
c. Reassembly

INITIAL SETUP

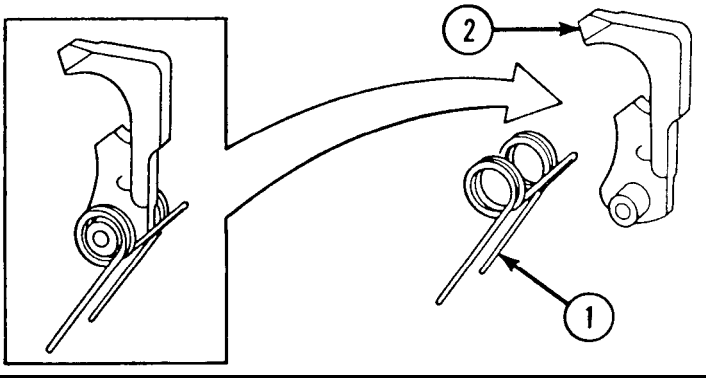
Applicable Configuration
All M16/M16A1 Rifles

Equipment Condition

Page	Condition Description
3-50	Hammer assembly removed

a. DISASSEMBLY

Remove hammer spring (1) from hammer (2).

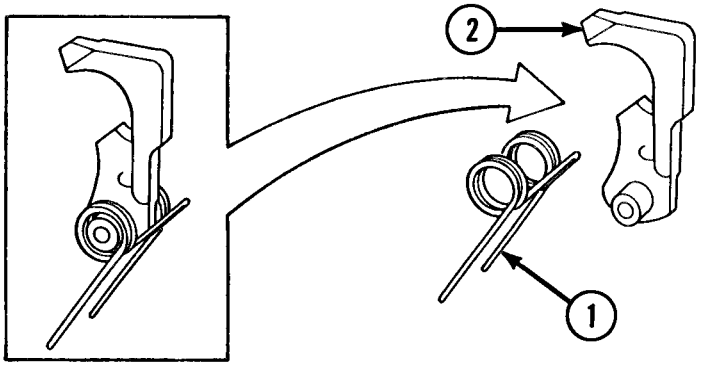


b. inspection/REPAIR

1. Inspect hammer spring for deformities, breaks, and bends. Replace if defective.
2. Inspect hammer for chips and breaks and excessive wear on automatic sear notch, disconnector notch, or sear notch. Replace if defective.
3. Install hammer pin into hole in hammer to check if the spring retains the hammer pin.

c. REASSEMBLY

Install hammer spring (1) on hammer (2).



3-18. TRIGGER ASSEMBLY.

This task covers:

a. **Disassembly**
b. Inspection/Repair
c. Reassembly

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

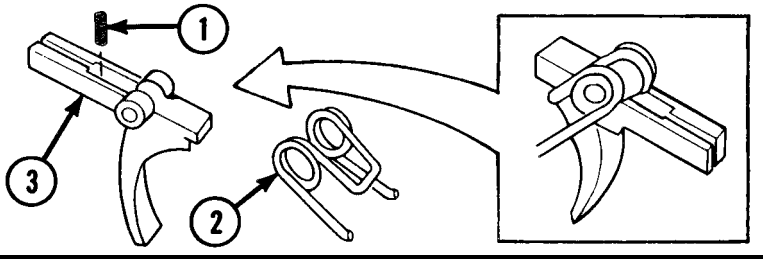
Equipment Condition

Page	Condition Description
3-50	Trigger assembly removed

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

a. DISASSEMBLY

Remove disconnector spring (1) and trigger spring (2) from trigger (3)



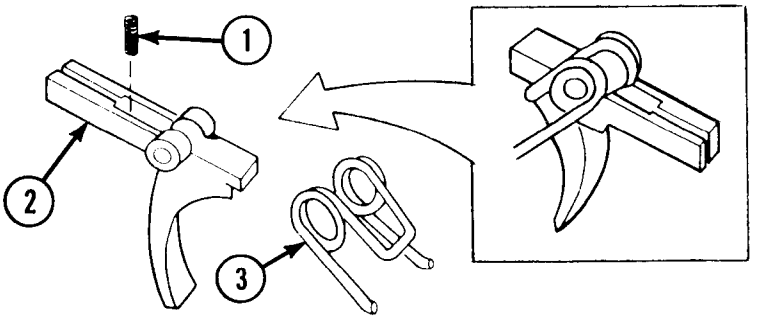
3-18. TRIGGER ASSEMBLY (CONT).

b. INSPECTION/REPAIR

1. **Inspect trigger spring for kinks, deformities, and weakness. Replace if defective.**
2. **Inspect disconnector spring for deformities, bends, breaks, and weakness. Replace If defective.**
3. **Inspect trigger for chips and cracks and excessive wear on trigger nose. Replace if defective.**

c. REASSEMBLY

1. **Install disconnector spring (1) by inserting large end of spring into trigger (2).**
2. **Install trigger spring (3) on trigger (2).**



3-19. LOWER RECEIVER AND EXTENSION SUBASSEMBLY.

This task covers:

a. **Disassembly**
b. **Inspection**
c. **Repair/Modify**
d. **Test**
e. **Reassembly**

INITIAL SETUP

Applicable Configuration
All M16/M16A1 rifles. The lower receivers have serial numbers and model numbers and will not be replaced by Direct Support Maintenance.

Test Equipment
Tool and Gage Set 8426685 (1 9204)

Tools
Field Maintenance Basic Less Power Small Arms Shop Set SC 4933-95-CL-A11 (19204)
Small Arms Repairman Tool Kit SC 5180-95-CL-A07 (19204)

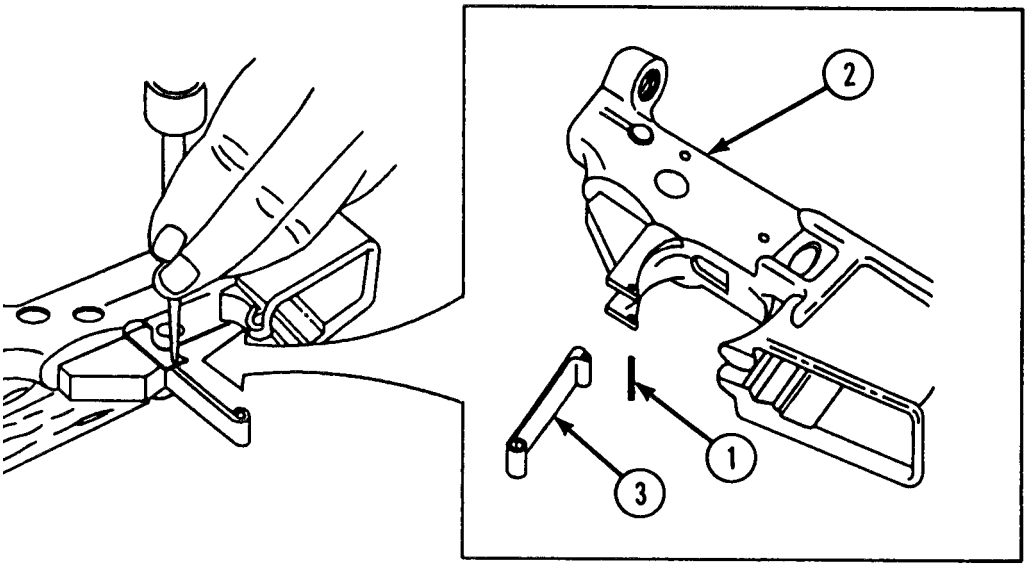
Materials/Parts
Cloth, abrasive (item 12, app D)
Grease, molybdenum disulfide (item 17, app D)
Lubricant, solid film (item 19, app D)

Equipment Condition
Page Condition Description
3-50 Lower receiver and extension subassembly removed.

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

a. DISASSEMBLY

1



(a) Remove spring pin (1) from lower receiver and extension subassembly (2) using 1/8-inch drive pin punch and hammer.

(b) Remove trigger guard (3).

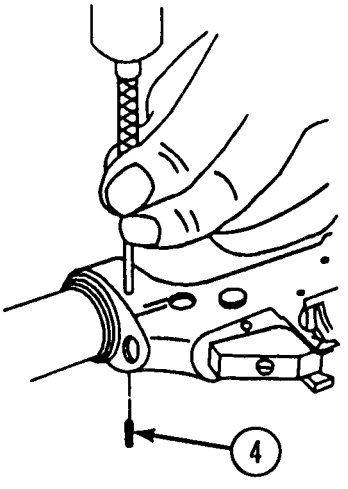
2

NOTE

Old type receiver extension requires removal discard of spring pin (4).

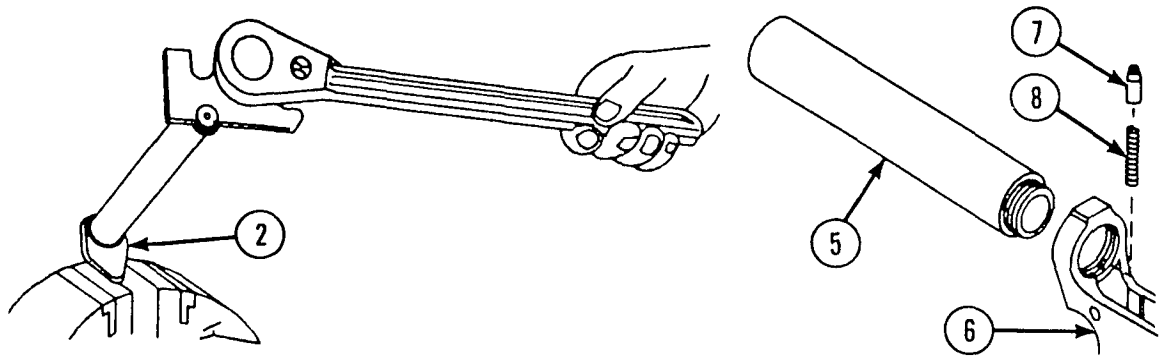
(a) **If spring pin (4) is installed, remove and discard.**

(b) Modify lower receiver extension prior to reassembly. See page 3-65, REPAIR/MODIFY.



3-19. LOWER RECEIVER AND EXTENSION SUBASSEMBLY (CONT).

3



WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

NOTE

Grip the solid portion of the lower receiver with wooden or brass vise jaws. Use wooden vise jaws instead of brass vise jaw caps if available.

(a) Clamp lower receiver and extension subassembly (2) in a machinist's vise using vise jaw caps and tighten on solid portion just tight enough to hold,

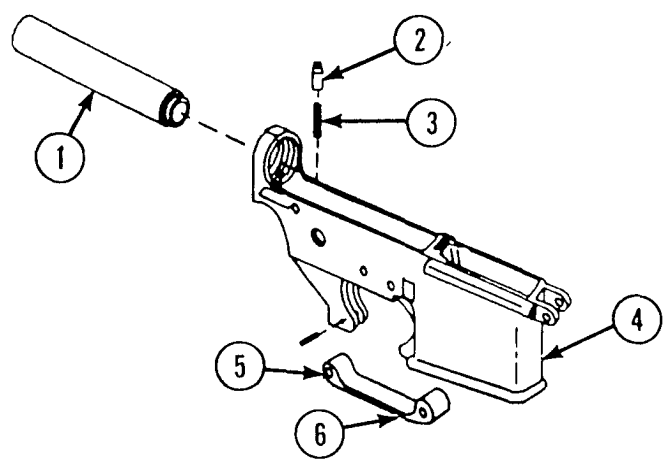
NOTE

As lower receiver extension is removed, catch buffer retainer and spring. Lower receiver is a serial number controlled item.

(b) **Remove lower receiver extension (5) from lower receiver (6) using combination wrench and socket wrench handle. Catch buffer retainer (7) and helical spring (8).**

b. INSPECTION

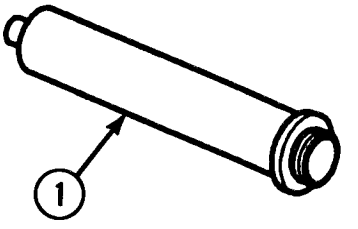
1. **Inspect lower receiver extension (1) for corrosion, dents, and wear. Repair or replace if defective. See page 3-55, REPAIR.**
2. **Inspect buffer retainer (2) for wear and replace if defective.**
3. **Inspect helical spring (3) for deformities and breaks. Replace if defective,**
4. **Inspect lower receiver (4) for corrosion, wear, and damage, See page 3-53, INSPECTION.**
5. **Inspect trigger guard (5) for deformities and check operation of plunger and spring (6). Replace trigger guard if defective.**



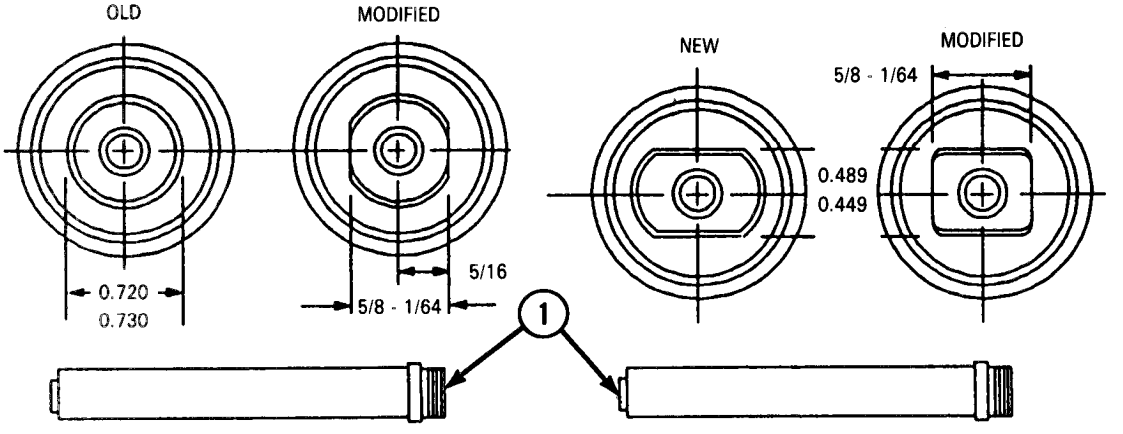
c. REPAIR/MODIFY

1

Repair lower receiver extension (1) by using abrasive cloth to remove light corrosion. Retouch using solid film lubricant,



2



NOTE

Lower receiver extensions are usable after forming of flats.

Modify lower receiver extensions (1) (when required) to above drawing dimensions using file handle, hand file, machinist's vise, and vise jaw caps.

3

(a) Inspect lower receiver (2) for damage. wear. anti corrosion (p 3-53). Repair or replace weapon.

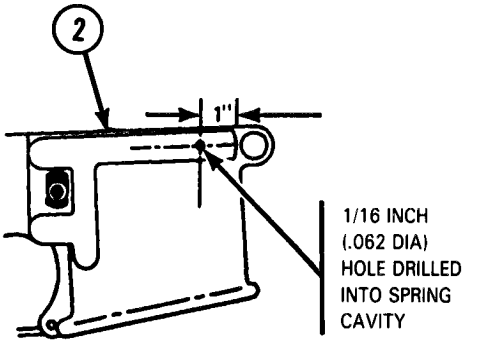
CAUTION

Use extreme care when drilling hole so that you do not penetrate inner wall of spring Cavity .

NOTE

Spring must be removed before drilling.

(b) Modify lower receiver (2), when required, to dimensions depicted using 1/1 6 twist drill and portable electric drill.



3-19. LOWER RECEIVER AND EXTENSION SUBASSEMBLY (CONT).

4

If serial number is hard to read on weapon, restamp as follows"

(a) Support the receiver in the stamping area to prevent bending and distortion of the receiver.

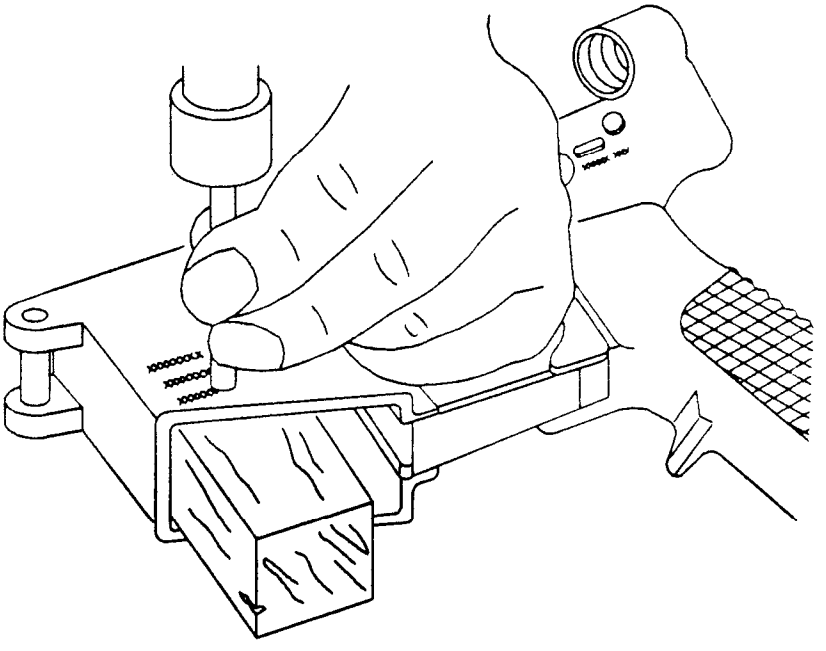
(b) Exercise extreme care to restamp the same serial number as original

(c) Restamp the serial number the same size as the originalserial number.

NOTE

Most weapon serial numbers are 1/8 inch in height, or close enough that this size is acceptable for such restamping. In the event that a weapon has a serial number that cannot be reproduced by the use of the die sets, local purchase of an appropriate size die set is authorized.

Replace defective components as authorized

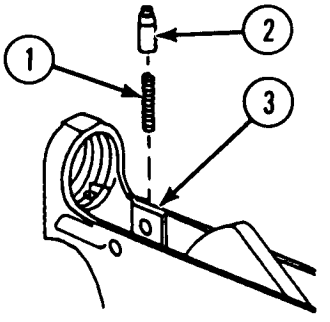


d. TEST

Test lower receiver and extension subassembly trigger pin holes and hammer pin holes. See page 3-56. Test lower receiver lobe area spacing. See page 3-56, TEST.

e. REASSEMBLY

1

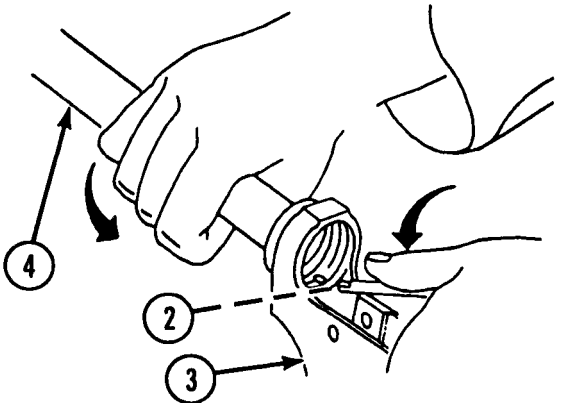


WARNING

To avoid injury to your eyes, use care when removing and installing spring-loaded parts.

Install helical spring (1) and buffer retainer (2) into lower receiver (3).

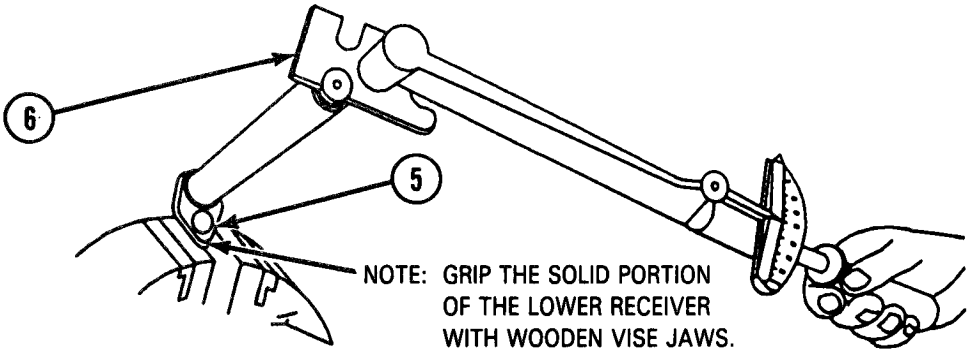
2



(a) **Lubricate threads of lower receiver (3) and lower receiver extension (4) with molybdenum disulfide grease before reassembly.**

(b) **Install lower receiver extension (4) into lower receiver (3) while depressing buffer retainer (2).**

3



NOTE

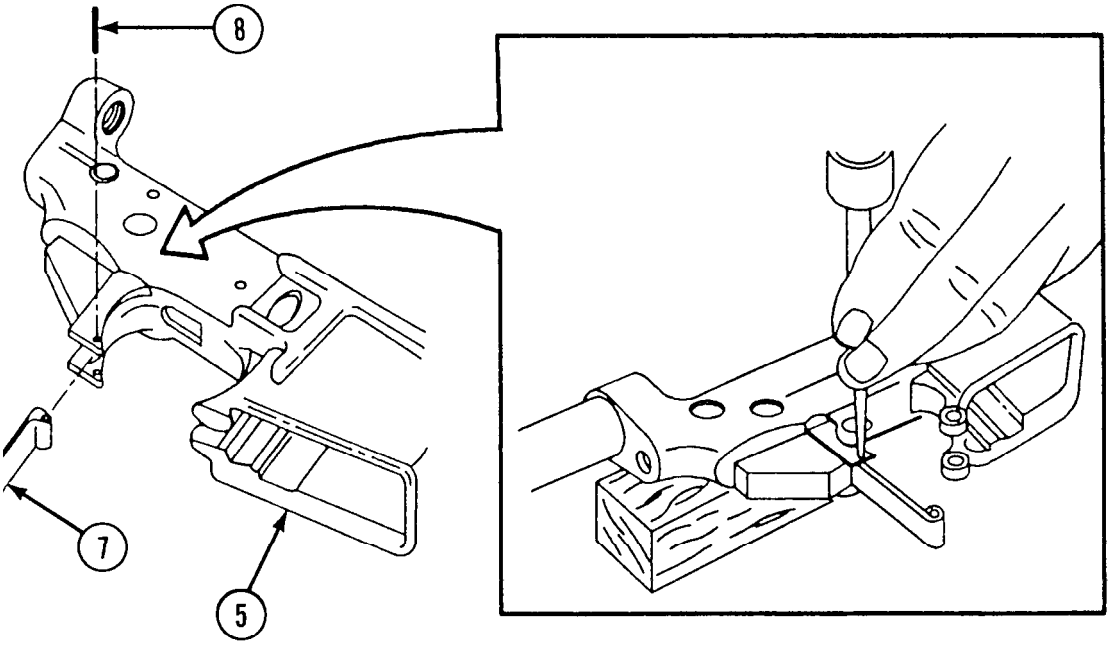
Use wooden vise jaws in machinist'a vise in place of brass vise jaw caps, if available.

(a) Clamp solid portion of lower receiver and extension assembly (5) in a machinist's vise using wooden vise jaws.

(b) Using combination wrench 11010033 (6) and torque wrench, torque lower receiver extension to 35-39 ft-lb. Torque is read when both wrenches are used together.

3-19. LOWER RECEIVER AND EXTENSION SUBASSEMBLY (CONT).

4



(a) Install trigger guard (7) into lower receiver and extension assembly (5).

(b) Fasten with spring pin (8) using 1/8-inch drive pin punch and hammer.

3-20. MAJOR COMPONENTS OF M16 AND M16A1 RIFLE.

This task covers:

a. Reassembly

b. Test

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

Test Equipment
Tool and Gage Set 846685 (1 9204

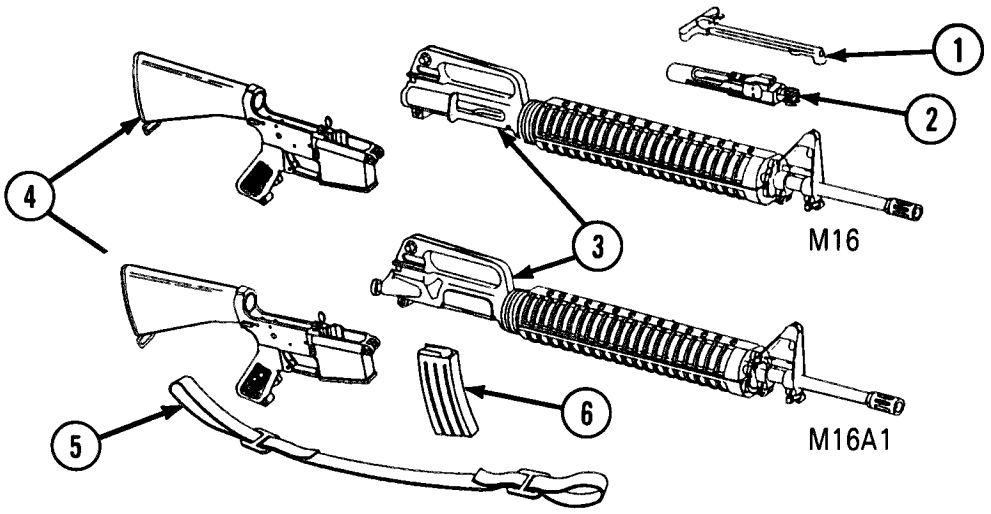
Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Reference
TM 9-1005-249-10 (operator's manual)

Equipment Condition
Weapon disassembled

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.
Live ammunition must not be near the work area.

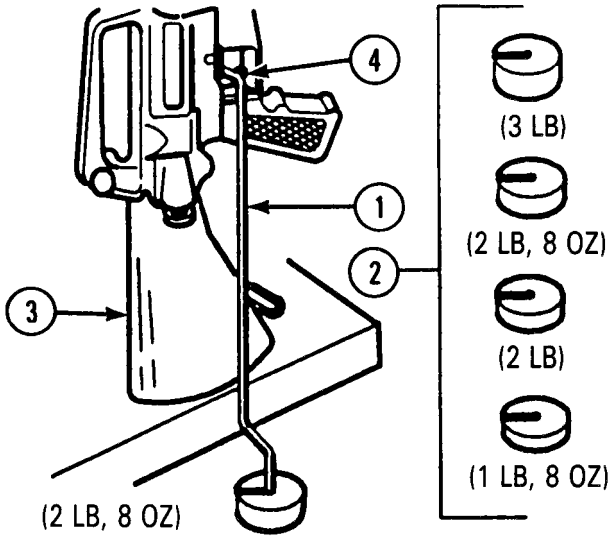
a. REASSEMBLY



1. Refer to operator's manual.
2. Install charging handle (1) and bolt carrier assembly (2) into upper receiver assembly (3). Join upper receiver assembly (3) and lower receiver assembly (4).
3. Snap on small arms sling (5) and install cartridge magazine (6).

b. TEST

1. Place test fixture rod (1) on bench and add test weights (2) until minimum load of 5.5 lbs is reached.
2. Charge the rifle. Place the selector lever in the semi position.
3. Hold the rifle (3) in a vertical position. Place the end of the test fixture (1) over the trigger (4). Slowly raise the rifle in a line parallel to the barrel until the fixture and weights are suspended.
4. The hammer must not fall. If the hammer falls, the trigger pull is too light and the trigger and/or hammer must be replaced. Replace the trigger and/or hammer in accordance with the maintenance procedures provided on pages 3-60 and 3-61. If replacement of hammer and/or trigger fails to correct light trigger pull, replace hammer spring (pg 3-60 and 3-61).
5. Add weights until maximum load of 8.5 lbs is reached. Repeat the above procedures. The hammer must fall. If the hammer does not fall, replace the trigger and/or hammer (see pg 3-60 and 3-61).



NOTE

Hammer must not trip until 5.5 pounds have been applied, and it must trip on applying 8.5 pounds.

3-21. Ml 6 AND M16A1 RIFLE FINAL INSPECTION.

This task covers:

a. Inspection

b. Test

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

Test Equipment
Tool and Gage Set 8426685 (1 9204

Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

Reference
TM 9-1005-249-10 (operator's manual)

Equipment Condition
Weapon assembled

General Safety Instructions
Live ammunition must not be near the work area.

Before starting an inspection on a weapon equipped with a low light level sight, check for damage to the low light level sight. See procedures listed on page 2-19.

a. INSPECTION

1

(a) Visually inspect general appearance of weapon. Weapon should look almost new. All metal surfaces are to have a dull, rust-or corrosion-resistant finish with no burrs or deep scratches. Solid film lubricant (item 19, app D) is the only authorized touch up for this weapon.
(b) Visually inspect barrel for serviceability. Barrels must be straight, clean, free of rust, powder fouling, and free of bulges and rings. Fine pitting is allowable.
(c) Visually inspect weapon for missing parts and serial numbers. All parts must be attached and all modifications must be applied. Serial numbers must be legible and steel parts must be rust free. Spring pins must be secure and screws must be tight.

2

Functionally inspect key and bolt carrier assembly and gas tube alignment. Refer to operator's manual and use the following procedures:

(a) Disengage the takedown pin and open the receiver.
(b) Remove bolt carrier assembly.
(c) Remove bolt assembly from bolt carrier assembly.
(d) Insert bolt carrier and key into upper receiver and barrel assembly. The bolt assembly must not be installed while performing test.
(e) Slide bolt carrier and key forward to detect binding between key and bolt carrier assembly and gas tube by feel. Badly bent gas tube could cause damage to both the key and bolt carrier assembly and the gas tube. A slightly bent gas tube will cause unnecessary wear of the carrier and key assembly and gas tube.
(f) Correct slight binding by removing hand guards and slightly bending gas tube in the handguard area while repeating step (e) above until no binding is detected. Badly bent gas tubes will be replaced and realigned.
(g) Remove key and bolt carrier assembly from upper receiver and barrel assembly.
(h) Reassemble bolt assembly into key and bolt carrier assembly.
(i) Reinstall bolt carrier assembly into upper receiver and barrel assembly.

3-21. M16 AND M16A1 RIFLE FINAL INSPECTION (CONT).

a. INSPECTION (CONT)

3 **(a) Make the following functional checks on assembled rifle with selector lever in SAFE, SEMI, and AUTO position. The test sequence is used for a rapid complete check. Any portion may be used alone to determine the operational condition of any special firing' position selected:**

(1) Remove magazine, if installed.

(2) **Pull charging handle assembly to rear. Check that chamber is clear. Let bolt and bolt carrier close. Leave hammer in cocked position. Do not pull trigger.**

WARNING

If **weapon fails any of the following tests, continued use of the weapon could result in injury to, or death of, personnel.**

(3) **Place selector lever in SAFE position and pull trigger. Hammer should not fall.**

(4) **Place selector lever in SEMI position.**

(5) **Pull trigger. Hammer should fall.**

NOTE

For the purpose of the following test "SLOW" is defined as 1/4 to 1/2 the normal rate of trigger release.

(6) **Hold trigger to the rear, charge weapon and release the trigger with a slow, smooth motion without hesitations or stops, until the trigger is fully forward (an audible click should be heard). Hammer should not fall.**

(7) **Repeat the above selector lever SEMI position test five times. The weapon must not malfunction during any of these five tests. If the weapon malfunctions during any of these five tests, see repair of lower receiver and extension assembly (p 3-55).**

(8) **Place selector lever in AUTO position. Charge weapon and pull trigger. Hammer should fall.**

(9) **Hold trigger to the rear, charge weapon, and release trigger. Pull trigger. Hammer should not fall. Automatic assembly sear should have released the hammer as the bolt closed.**

(10) With the hammer in the forward position and using finger/thumb pressure, attempt to place the selector lever in SAFE position. The selector lever must not move into SAFE position.

(b) **Perform the following additional functional checks and adjustment on assembled rifle:**

(1) **Press magazine catch button. Make sure it functions properly.**

(2) Press bolt catch. Make certain it operates smoothly and holds bolt in open position.

(3) Adjust front sight and rear sight. Make certain they can be adjusted properly. Refer to operator's manual.

(4) Actuate forward assist assembly (M16A1 rifles only). It must work freely.

b. TEST

1. **Check headspace using headspace gage PN 7799734. See page 3-38, TEST.**
2. **Check firing pin protrusion using firing pin protrusion gage PN 7799735. See page 3-13, TEST.**
3. **Check extent of barrel erosion using barrel erosion gage PN 8448496 or PN 7799792. See pages 3-35 and 3-37, TEST.**
4. **Check muzzle erosion using muzzle erosion gage PN 8448677 (non-chrome barrels only) (p 3-35).**
5. **Check barrel straightness using barrel straightness gage PN 8448202 (P 3-37).**
6. **Check firing pin hole using firing pin hole gage PN 12620101 (p 3-1 8).**
7. **Refer to trigger pull test (p 3-69).**

3-22. M16 AND M16A1 RIFLE ANNUAL INSPECTION AND GAGE REQUIREMENTS.

This task covers:

a. Inspection

b. Gaging

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

Test Equipment
Tool and Gage Set 8426685

Tools
DA Form 2407
Small Arms Repair Tool Kit
SC 5180-95-CL-A07 (19204)
Field Maintenance Basic Less Power Small Arms
Shop Equipment SC 4933-95-CL-A11 (19204)

Reference
TM 9-1005-249-10 (operator's manual)
AFR 50-36. Volume 1

Equipment Condition
Weapon assembled.

General Safety Instructions
To avoid injury to your eyes, use care when removing and installing spring-loaded parts.
Before starting an inspection on a weapon equipped with a low light level sight, check for damage to the sight and decontaminate if required. See procedures in Chapter 2, Section V.

All rifles used at training centers (Army only) should be inspected and gaged at the end of each training cycle. This gaging/inspection will be conducted at the discretion of the unit commander. However, the time between inspection shall not exceed one year.
All Active Army M16/M16A1 rifles must be inspected and gaged at least once annually for safety.
All Army Reserve and Army National Guard M16/M16A1 rifles must be inspected and gaged at least once every two years, after the initial inspection/gaging procedures have been accomplished. This two year interval may be maintained unless preventive maintenance checks and services (PMCS), or other physical evidence indicates that an individual unit's M16/M16A1 rifles require inspection at a more frequent interval. If it is determined that a yearly inspection is necessary for an individual unit, only that unit will be affected. This will not affect other units in regard to the interval of inspection.
Air Force M16 rifle will be inspected in accordance with AFR 50-36, Volume 1, Chapter 5.

a. INSPECTION

1. Visually inspect general appearance of rifle. Overall appearance will be approximately that of a new weapon. For inspection criteria refer to final inspection, page 3-73. All visual and functional inspection requirements must be met.

NOTE

To perform the following tests, disassemble weapon only as far as allowed in chapter 2 (Unit Maintenance Instructions), unless a deficiency is uncovered.

2. Perform a general inspection of rifle per chapter 3 (Direct Support Maintenance Instructions) section V. Repair as required and authorized.

3-22. M16 AND M16A1 RIFLE ANNUAL INSPECTION AND GAGE REQUIREMENTS (CONT).

b. GAGING

1. Gage bolt assembly for firing pin protrusion using firing pin protrusion gage PN 7799735. See page 3-13, TEST.
2. Gage bolt assembly for firing pin hole wear using not-go plug gage PN 12620101. See page 3-13, TEST.
3. Inspect chamber in upper receiver and barrel assembly using chamber reflector tool PN 8448201. See page 3-26, inspection/CLEANING.
4. Gage barrel in upper receiver and barrel assembly using barrel erosion gage PN 7799792 or PN 8448496 as applicable. Use muzzle erosion gage PN 8448677 on nonchromed barrels only. Use bore straightness gage PN 8448202 on all barrels. See pages 3-35 through 3-39, TEST.
5. Check headspace in upper receiver and barrel assembly by inserting headspace gage PN 7799734 in chamber. See page 3-38, TEST.
6. Gage hammer and trigger pin holes in lower receiver assembly using not-go plug gage PN 12006472. See page 3-56, TEST.
7. Gage trigger pull using trigger pull measuring fixture PN 7274758. See page 3-69, TEST.
8. Document inspection with DA Form 2407 and DD Form 314 when completed. Air Force users refer to AFTO Form 105.

Section VI. PREEMBARKATION INSPECTION OF MATERIEL IN UNITS ALERTED FOR OVERSEAS MOVEMENT

3-23. GENERAL. Refer to TB 9-1000-247-34.

CHAPTER 4

MAINTENANCE OF AUXILIARY EQUIPMENT

CHAPTER OVERVIEW

This chapter contains information and instructions to keep auxiliary equipment used with your weapon in good repair.

Section I. UNIT AUXILIARY EQUIPMENT

4-1. GENERAL. This chapter covers Unit and Direct Support Maintenance of Auxiliary Equipment.

a. The following materiel is used in conjunction with the M16/M16A1 rifle:

(1) Bayonet-knife M7, NSN 1005-00-073-9238.

(2) Bayonet-knife scabbard M10, NSN 1095-00-223-7164.

(3) 40-mm Grenade Launcher M203, NSN 1010-00-179-6447.

(4) Low Light Level Sight (front), NSN 1005-00-234-1568, Low Light Level Sight (rear), NSN 1005-00-071-8015.

NOTE

The Low Light Level Sights (front and rear) are no longer being manufactured and are obsolete items.

(5) Lock Plate, NSN 1005-00-233-9031.

(6) Top Sling Adapter, NSN 1005-00-406-1570

(7) Rifle Bipod M3, NSN 1005-00-992-6676.

(8) Bipod Carrying Case, NSN 1005-00-283-9439.

(9) Blank Firing Attachment M15A2, **NSN 1005-00-118-6192.**

b. Refer to TM 9-1010-221-24&P for unit maintenance for the Grenade Launcher M203.

c. Refer to TM 9-1005-237-23&P for repair instructions and repair parts for Bayonet-Knife M7 and Bayonet-Knife Scabbard M10.

d. Refer to TM 9-6920-363-12&P for unit maintenance of the M261 Conversion Kit (caliber .22 rimfire adapter).

e. Coast Guard (ONLY) NAVSEA OP 4445 M87 MOD 1 Line Throwing Rifle Adapter Kit.

4-2. LOW LIGHT LEVEL FRONT SIGHT.

This task covers:

a. Disassembly
b. Inspection
c. Reassembly
d. Wrapping and Packaging

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

Tools
Front sight post and low light level front sight post removal/installation tool (fig E 1, app E)

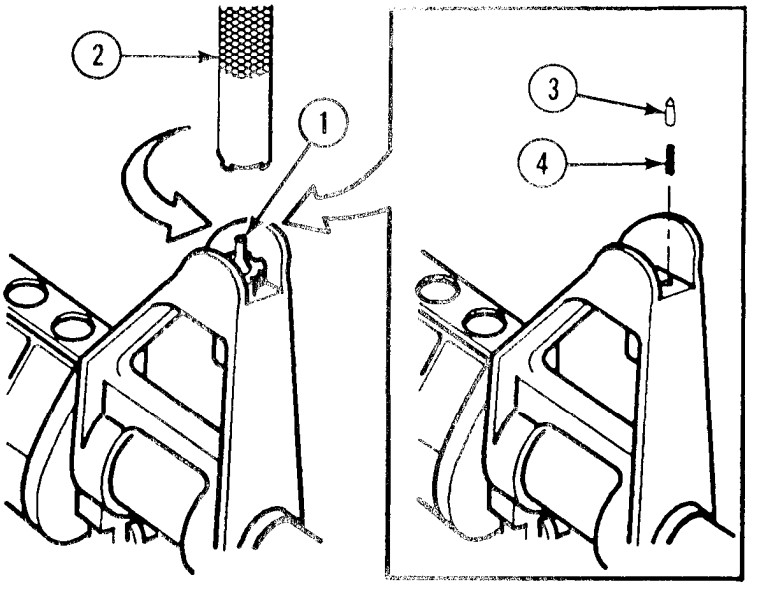
Reference
Warning page radiation hazard.

General Safety Instructions
Low light level sights will be removed from weapons that are being transferred or unserviceable or are being disposed.

Low light level front sight contains radioactive material.
Do not insert metal objects into the post slot or otherwise treat sight roughly to cause breakage of the radioactive element.
Do not eat, drink, or smoke while working on the low light level sights.

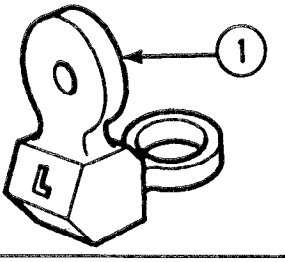
a. DISASSEMBLY

1. Remove low light level front sight (1) using front sight post and low light level front sight post removing and installation tool (2).
2. Catch front sight detent (3) and helical spring (4) to prevent loss.



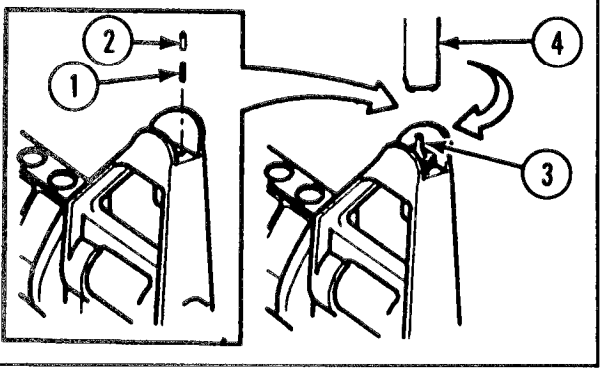
b. INSPECTION

Visually inspect low light level front sight for broken/or damaged radioactive element. Inspect manufacturer's data. Replace sight if more than 144 months have elapsed. Ensure that the rear sight is the rear low light level sight (1). If not, you must have direct support maintenance replace the standard rear sight with the rear low light level sight as the sights must mate. Ensure the sight is marked with luminous material H3. Sights with any other luminous material must be replaced with the appropriate sight.



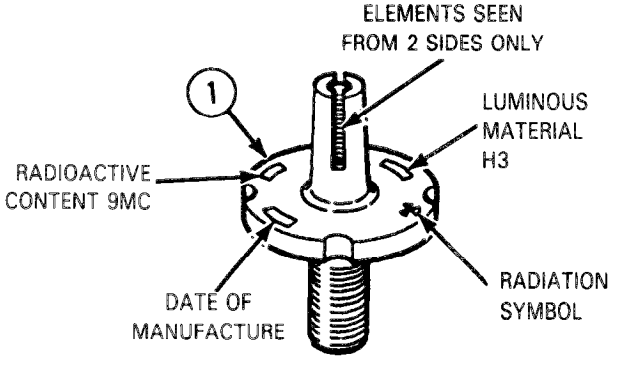
c. REASSEMBLY

1. Install helical spring (1), front sight detent (2) and hold in position.
2. Install low light level front sight (3) using front sight post and low light level front sight post removing and installation tool (4).



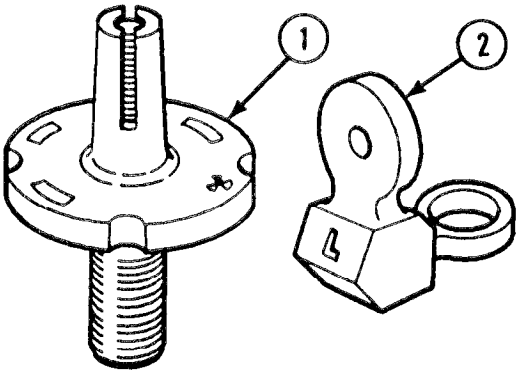
d. WRAPPING AND PACKAGING

1



Broken low light level sight post (1) will be removed and placed in a plastic bag. All defective and/or outdated components will be returned to the storage activity for disposal in accordance with AR 385-11.

2



(a) Low light level systems that have been removed from rifles will be protected by applying a protective, chemically-neutral paper conforming to MIL-P-17667 (SB 38-100) and placed in a plastic bag.

(b) Final packaging of rear (2) and front (1) low light level sights will be in accordance with instructions provided in MIL-STD-1169, pending possible reuse or disposal. These packaging criteria are furnished since a terminal test for radiation and luminosity will be required.

4-3. LOCK PLATE.

This task covers:

a. Installation
b. Removal
c. Inspection

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

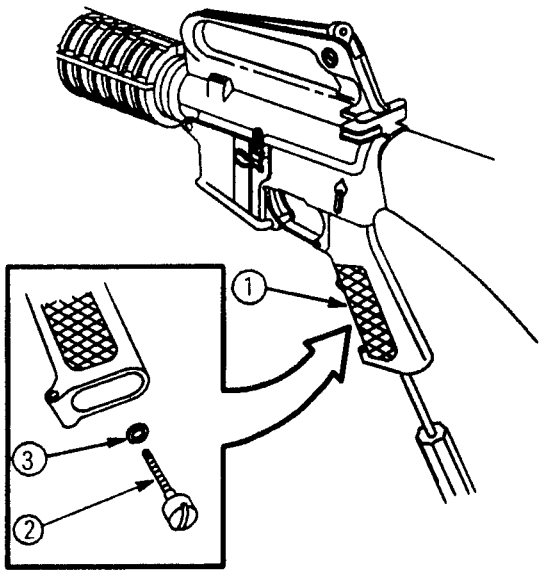
Tools
Small Arms Repairman Tool Kit
SC 5180-95-CL-A07 (19204)

WARNING

The lock plate prevents the selector from being placed in AUTO and will be installed at the discretion of the unit commander. It is mandatory for use in civil disturbance (riot control).

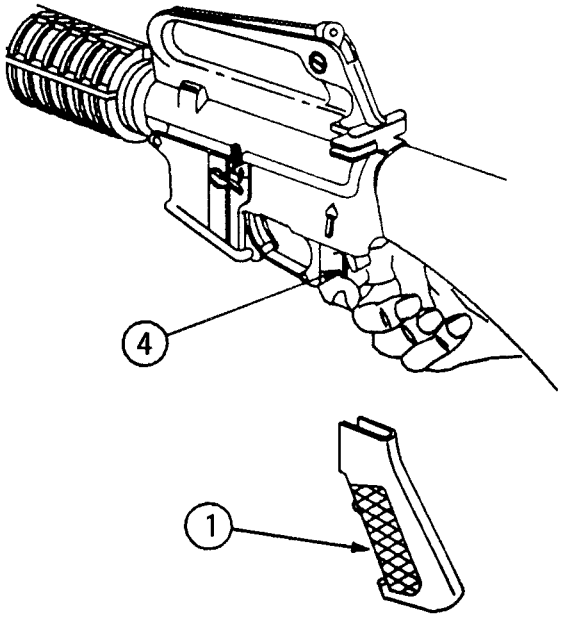
a. INSTALLATION

1



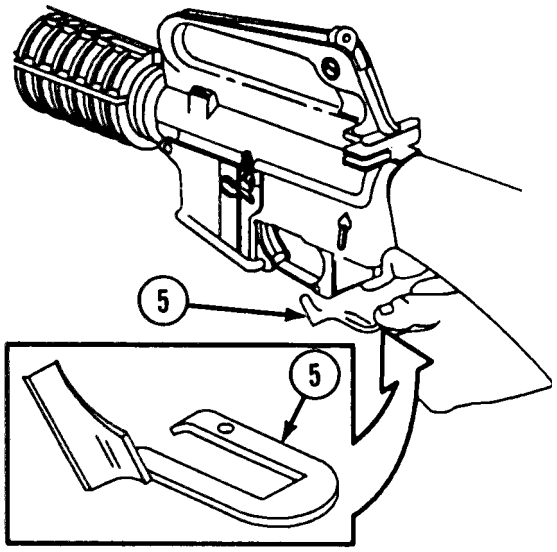
Using a screwdriver, reach inside rifle grip (1) and remove screw (2) and lockwasher (3).

2



Carefully remove rifle grip (1). Hold helical spring (4) in place.

3

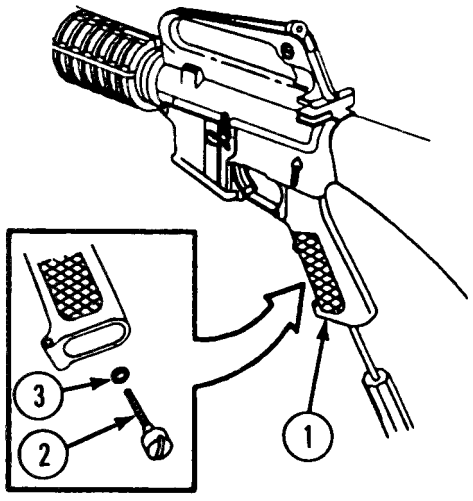


NOTE

Selector lever must be in SAFE or SEMI position.

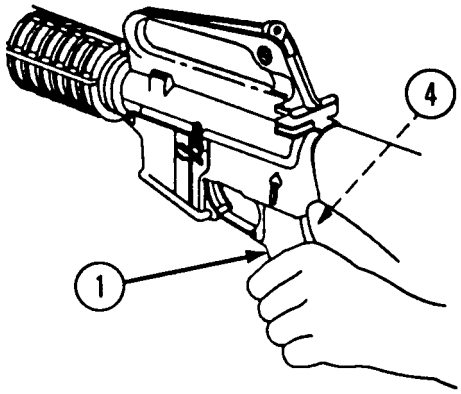
Install lock plate (5) with the detect helical spring passing through the hole in the right side of the lockplate, and the arm on the outside of the receiver pointing to the SAFE position.

5



Using a screwdriver, secure grip (1) by installing lockwasher (3) and screw (2).

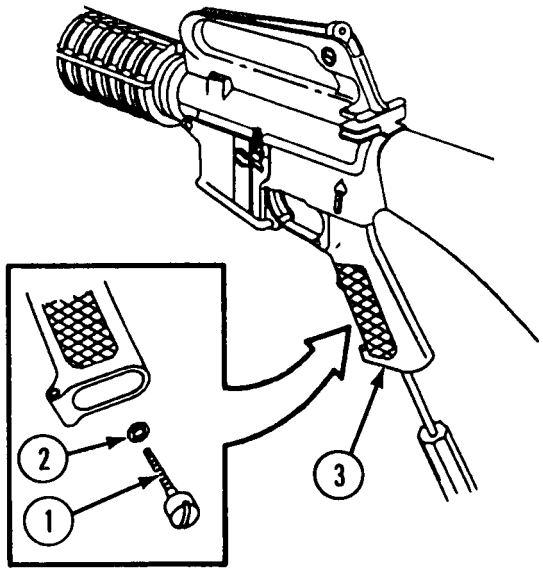
4



Carefully compress helical spring (4) and position rifle grip (1).

b. REMOVAL

1

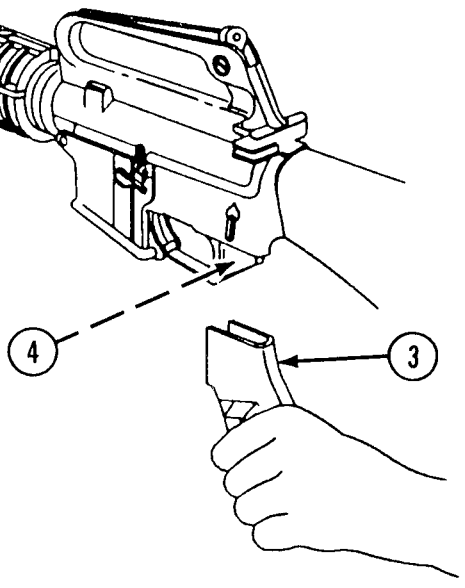


Using a screwdriver, remove screw (1) and lockwasher (2) from rifle grip (3).

4-3. LOCK PLATE (CONT).

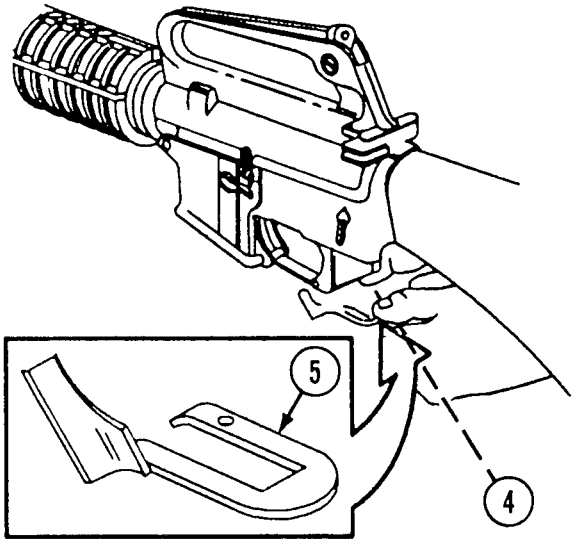
b. REMOVAL (CONT)

2



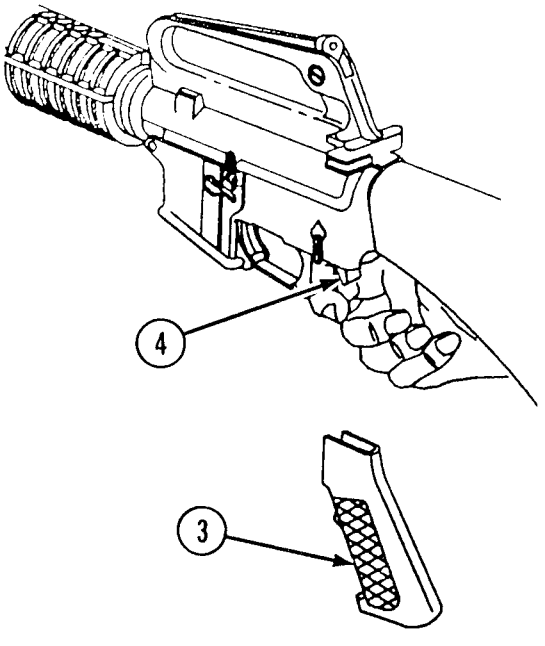
Carefully remove rifle grip (3) and hold helical spring (4) in place.

3



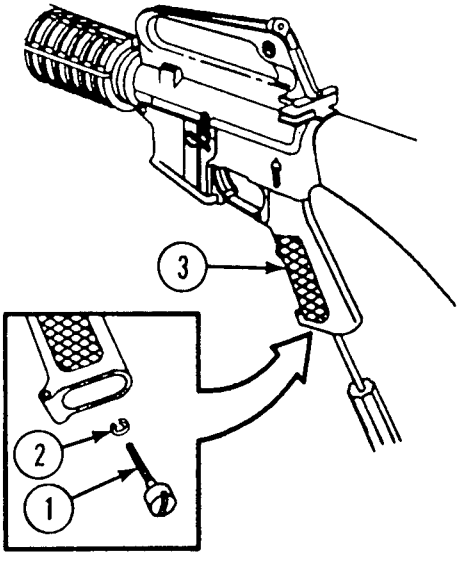
Still holding helical spring (4) in place, remove lockplate (5).

4



Carefully compressing helical spring (4), position rifle grip (3).

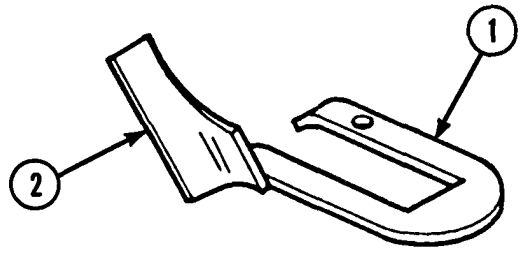
5



Using a screwdriver, secure rifle grip (3) with lockwasher (2) and screw (1).

c. INSPECTION

Inspect lock plate (1) for bends affecting serviceability or for missing tang (2). Replace if unserviceable or if tang (2) is broken off.



4-4. TOP SLING ADAPTER.

This task covers:

a. Installation
b. Removal
c. Inspection

INITIAL SETUP

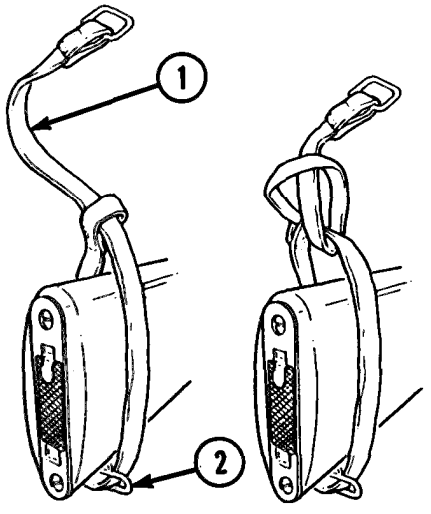
Applicable Configuration
All M16/M16A1 Rifles

Reference
TM 9-1005-249-10 (operator's manual)

Materials/Parts
Top sling adapter kit PN 8448471

a. INSTALLATION

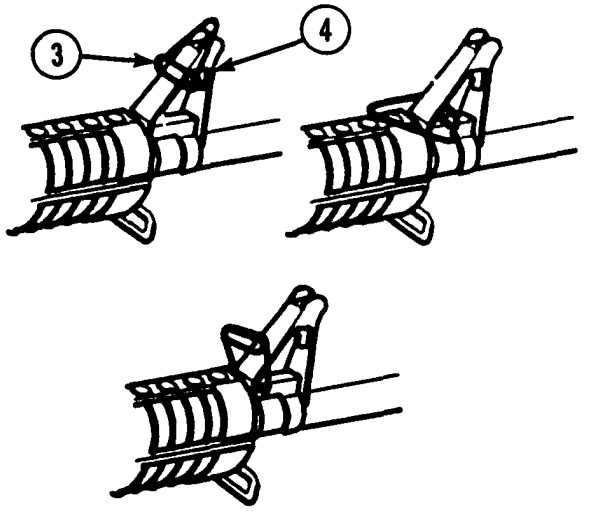
1



(a) Refer to operator's manual and remove rifle sling.

(b) Install top sling adapter strap (1) through sling swivel (2) and tie.

2

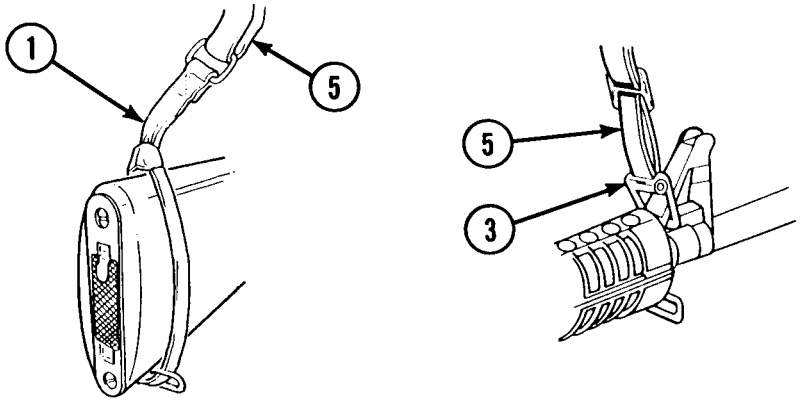


Install clamp (3) on front sight base (4).

4-4. TOP SLING ADAPTER (CONT).

a. INSTALLATION (CONT)

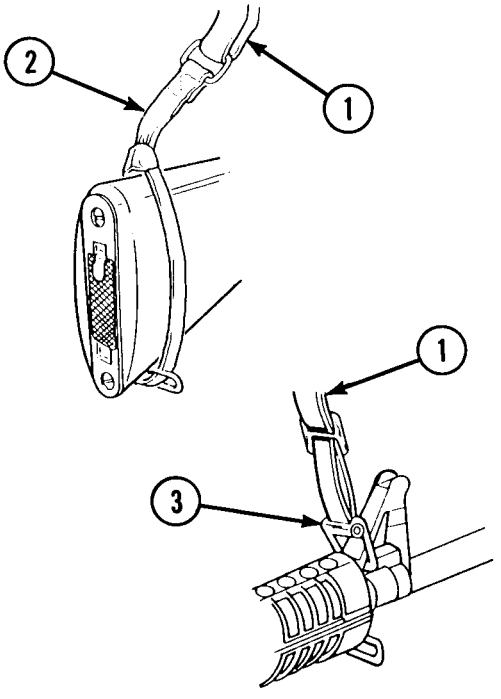
3



(a) Attach rifle sling (5) to top sling adapter strap (1) and to clamp (3).
(b) Adjust sling (5).

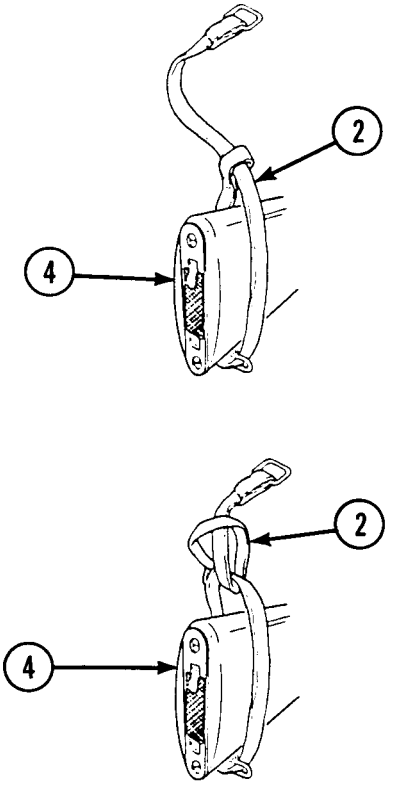
b. REMOVAL

1



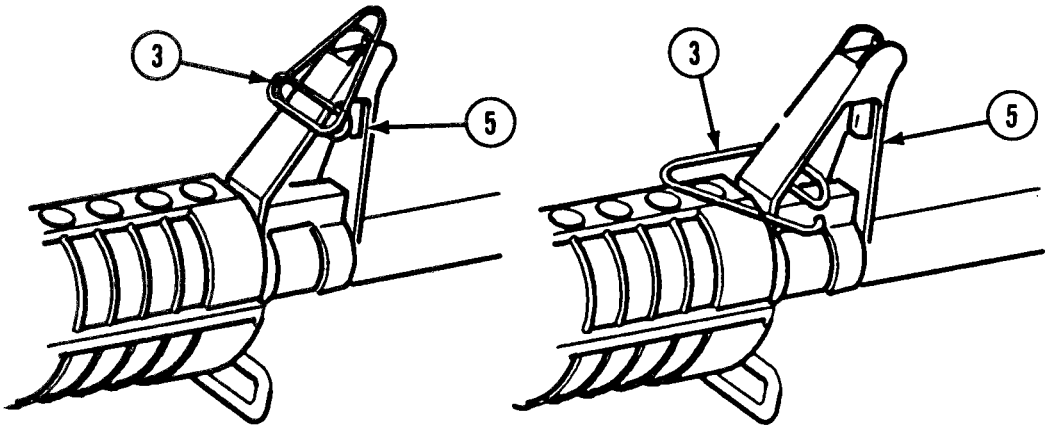
Remove rifle sling (1) from top sling adapter strap (2) and clamp (3).

2



Untie top sling strap (2) and remove from buttstock (4).

3

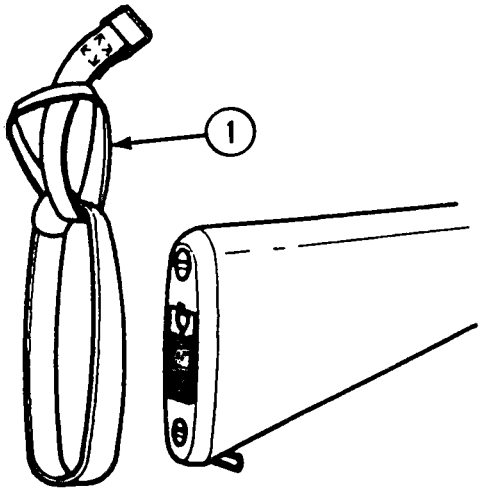


(a) Remove clamp (3) from front sight base (5).

(b) Refer to operator's manual and install rifle sling.

c. INSPECTION

Visually inspect top sling adapter strap (1) and replace if it is badly worn or damaged.



4-5. RIFLE BIPOD M3.

This task covers:

a. Installation
b. Removal
c. Inspection

INITIAL SETUP

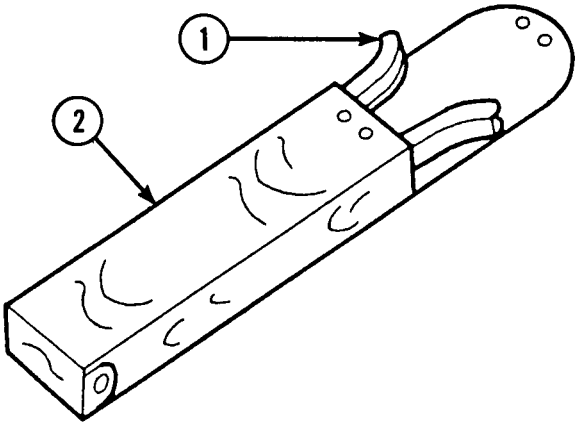
Applicable Configuration
All M16/M16A1 Rifles

Materials/Parts
Carrying case NSN 1005-00-283-9439
Rifle biped M3 NSN 1005-00-992-6676

a. INSTALLATION

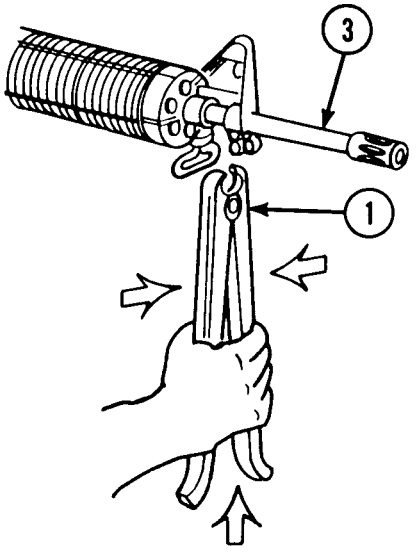
1

Remove rifle biped M3 (1) from case (2).

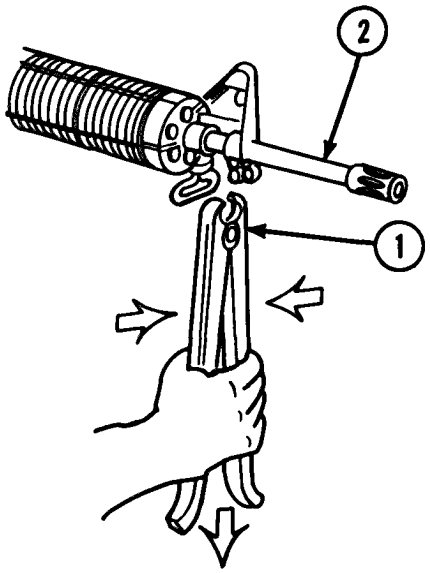


2

To install rifle biped M3 (1), squeeze biped legs together, snap on rifle barrel (3), and release biped legs.

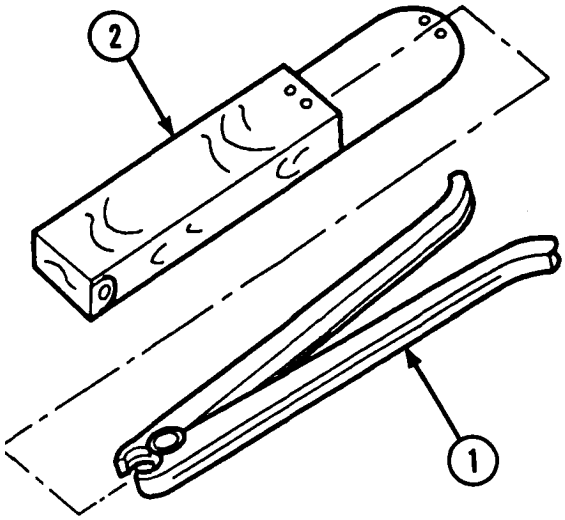


b. REMOVAL



1. Squeeze bipod legs (1) together and remove from rifle barrel (2).
2. Install bipod in case.

c. INSPECTION



1. Visually inspect bipod (1) for bent or broken parts. Damaged, broken, or bent bipods should be replaced. Bipod must have a good finish.
2. Inspect bipod case (2) for wear. Badly worn cases should be replaced.

4-6. BLANK FIRING ATTACHMENT M15A2.

This task covers:

a. **Installation**
b. **Removal**
c. **Cleaning**
d. **Inspection**
e. **Repainting**
f. **Replacement**

INITIAL SETUP

Applicable Configuration
All M16/M16A1 Rifles

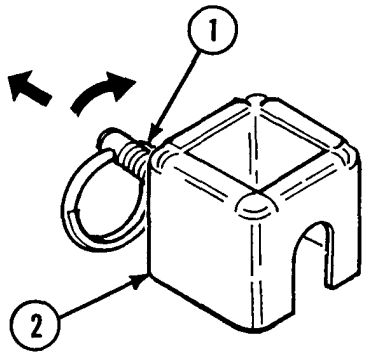
Materials/Parts
Cleaner, lubricant and preservative (CLP) (item 9, app D)
Cleaning compound, rifle bore (RBC) (item 11, app D)
Coating compound, fluorescent (item 13, app D)
Lubricating Oil, Weapons (LAW) (item 20, app D)
Lubricating Oil, Weapons (LSA) (item 21, app D)

General Safety Instructions
Do not keep live ammunition near the work area. Only blank cartridge M200 is to be used when the blank firing attachment is attached to the rifle.

4-6. BLANK FIRING ATTACHMENT M15A2 (CONT).

a. INSTALLATION

1

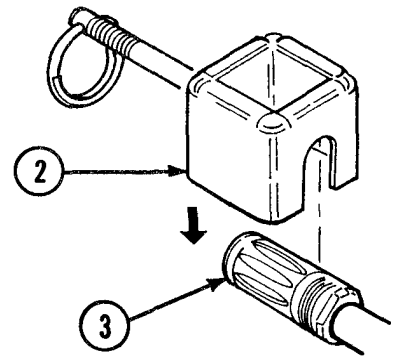


WARNING

Do not shoot objects with blanks closer than 20 feet.

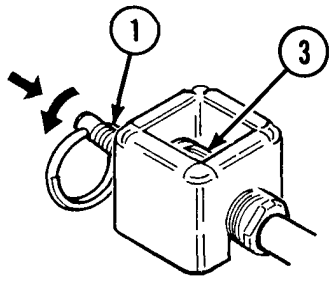
Unscrew and pull slide (1) all the way out on blank firing attachment (2).

2



Hook blank firing attachment (2) behind the first groove of the flash suppressor (3).

3



CAUTION

Do not use tools to tighten the blank firing attachment. USE HANDS ONLY.

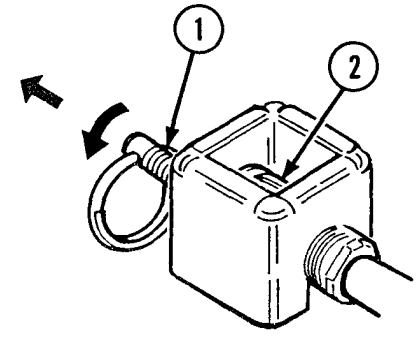
Push slide (1) into flash suppressor (3) and hand tighten.

NOTE

Check and retighten after firing approximately 50 blank rounds.

b. REMOVAL

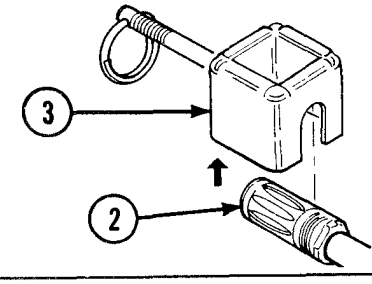
1



Unscrew and pull slide (1) all the way out of flash suppressor (2).

2

Lift blank firing attachment (3) up off of flash suppressor (2).



c. CLEANING

Clean blank firing attachment with CLP or RBC, wipe dry, and lubricate with CLP, LSA, or LAW (P 2-22).

d. INSPECTION

Inspect blank firing attachment for cracks or distortion. Be sure the parts in the slide are clear and clean. If blank firing attachment is cracked or distorted, it is unserviceable.

e. REPAINTING

Blank firing attachment must be clean and all lubricant must be removed prior to painting. Repaint blank firing attachment using fluorescent coating compound. Painting is the only repair authorized.

f. REPLACEMENT

Replace blank firing attachment if unserviceable.

Section II. PREPARATION FOR STORAGE OR SHIPMENT

4-7. PREPARATION FOR SHIPMENT.

a. Rifles, bipod assemblies, or grenade launchers removed from storage for shipment need not be reprocessed unless inspection reveals them to be inadequately preserved,

b. Packaging, if required, for shipping/storage which will not exceed 90 days shall be as follows:

(1) Clean in accordance with TM.

(2) Wrap with MIL-B-121 waterproof material.

(3) Place in barrier bag MIL-B-117, Type I, Class C, or wrap with MIL-B-121, Type 1, Grade A, and seal with tape, PPP-T-76.

(4) Place One Or more Of item in minimum size container. Block and brace in accordance with MIL-STD-1186. Cushion the M16 and similar weight items with PPP-C-843, and use PPP-F-320 as filler, to create a tight pack.

(a) Fiberboard containers shall be in accordance with PPP-B-636 and may be Class Domestic. Gross weight and size of material shall determine grade of fiberboard container. PPP-B-640 may also be used.

(b) Wood containers shall be in accordance with PPP-B-601 or PPP-B-621.

(5) Equivalent materials may be used.

(6) Mark IAW MIL-STD-129.

4-8. SHIPMENT OF RIFLES TO DEPOT THAT ARE IN EXCESS TO USER. All rifles that are being returned to depot that are in excess to user will be returned in serviceable condition, condition code A, if local CATM has the ability to repair. (Rifles will be returned with magazine and sling.)

APPENDIX A

REFERENCES

A-1 . TECHNICAL BULLETINS.

TB 9-1000-247 -34	Standards for Overseas Shipment or Domestic Issue of Small Arms, Aircraft Armament, Towed Howitzers, Mortars, Recoilless Rifles, Rocket Launchers and Associated Fire Control Equipment
TB 43-0002-73	Maintenance Expenditures Limits for FSC Group 10; FSC Classes 1005, 1010, 1015, 1030, 1055, 1090, and 1095
TB 43-0196	Inspection and Certification of Gages - Small Arms

A-2. TECHNICAL MANUAL/TECHNICAL ORDERS.

TM 9-1005-237 -23&P	Unit and Direct Support Maintenance Manual (Including Repair Parts and Special Tools List) for Bayonet-Knife M6 and M7, with Bayonet Knife Scabbard M10
TM 9-1005-249 -10	Operator's Manual for Rifle, 5.56MM, M16 and M16A1
TM 9-1010-221 -24&P	Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools List for Launcher, Grenade: 40-mm M203 W/E (NSN 1010-00-1 79-6447)
TM 9-6920 -363 -12& P	M261 Conversion Kit
TM 11-1090-268-13	Operator's, Organizational, and Direct Support Maintenance Manual: Night Vision Sight, Individual Served Weapon AN/PVS-1
TM 750-244-7	Procedures for Destruction of Equipment in Federal Supply Classifications 1000, 1005, 1010, 1015, 1020, 1025, 1030, 1055, 1090, and 1095 to Prevent Enemy Use
TO 00-35D-54	Technical Order, Materiel Deficiency Reporting and Investigating System
TO 11W-1-10	Recording of Inspection, Maintenance, and Firing Date for Ground Weapons
TO11W3-5-5-1	Operator's Manual for Rifle, 5.56 MM, Ml 6 and M16A1
TO 33K-1-100	Technical Manual (TMDE) Interval Calibration and Repair TO Reference Guide and Work Unit Code Manual
TO 11 A 13-10 -7	Storage and Maintenance Procedures for Small Arms Ammunition

A-3. ARMY/AIR FORCE REGULATIONS

AR 385-11	Ionizing Radiation Protection (Licensing, Control, Transportation, Disposal, and Radiation Safety)
AR 700-64	Radioactive Commodities in the DOD Supply System (NAVSUPPUB 5012/AFM 67-8/MCO P4400. 105/DSAM 41 45.8)
AFR 50-36 Volume 1	Combat Arms Training and Maintenance Program Management

A-4. FIELD MANUALS

FM 21-11	**First Aid for Soldiers**
FM 23-9	**M16A1 Rifle and Rifle Marksmanship**

A-5. PAMPHLETS

DA PAM 25-30, ...	**Consolidated Index Army Publications and Forms**
DA PAM 738-750, ...	**The Army Maintenance Management System (TAMMS)**

A-6. RELATED PUBLICATIONS

COMDTINST M4855.1 .,	**Comptroller Manual Volume 10 Quality Assurance**
CTA 8-100	**Army Medical Department Expendable/Durable Items**
CTA 50-970	**Expendable/Durable Items (Except: Medical, Class V, Repair Parts and Heraldic Items)**
MIL-STD-1169	**Packaging, Packing and Marking for Shipment to Inert Ammunition Components**
MIL-B-121	**Barrier Material, Greaseproofed, Waterproofed, Flexible (NSN 8135-00-753-4661)**
MIL-B-117	**Bag, Sleeve and Tubing-interior Packaging (NSN 8135-00-543-6574)**
PPP-B-636	**Boxes, Shipping, Fiberboard**
PPP-B-601	**Boxes, Wood, Cleated Plywood**
MIL-STD-129	**Marking for Shipment and Storage**
PPP-T-76	**Tape, Packaging, Paper**
MIL-STD-1186 . ., ., ...	**Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with appropriated test methods**
PPP-C-843	**Cushioning Material, Cellulosic**
PPP-F-320	**Fiberboard, Corrugated and Solid Sheet Stock (Container Grade), and Cut Shapes**
PPP-B-640	**Boxes, Fiberboard, Corrugated, Triple-Wall**
PPP-B-621	**Boxes, Wood, Nailed and Locked-Corner**
SPI 00-856-6885	**Special Packaging Instructions**

A-7. SUPPLY CATALOGS.

SC 5180-95-CL-A07	**Small Arms Repairman Tool Kit**
SC 4933-95-CL-A11	**Field Maintenance Basic Less Power Small Arms Shop Set**

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section 1. INTRODUCTION

B-1 . GENERAL.

a. **This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.**

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. **Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.**

B-2. MAINTENANCE FUNCTIONS. Maintenance functions will be limited to and defined as follows: (except for ammunition MAC[1]).

a. Inspect. **To determine the serviceability of any item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).**

b. Test. **To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of** an **item and comparing those characteristics with prescribed standards.**

c. Service. **Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.**

d. Adjust. **To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.**

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. **To determine and cause corrections to be made or to be adjusted on instruments or test, measuring and diagnostic equipments used in precision measurement. Consists of comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.**

NOTE

Air Force Precision Measurement Equipment Laboratory (PMEL) person will calibrate small arms inspection gages in accordance with TO 33K-1 -100.

g. Remove/Install. **To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.**

h. Replace. **To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.**

---

[1] **Exception** IS **authorized for ammunition MAC to permit the redesignation/redefinition of maintenance function headings to more adequately identify ammunition maintenance functions. The, heading designations and definitions will be included in the appropriate technical manual for each category of ammunition.**

i. Repair. The application of maintenance services[2], including fault location/troubleshooting[3], removal/installation, and disassembly/assembly[4] procedures, and maintenance actions[5] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i. e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00. "

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

C . . . Operator or Crew	H . General Support Maintenance
O . . . . . Unit Maintenance	L... . . . . Specialized Repair Activity (SRA)[6]
F... . . . . Direct Support Maintenance	D . Depot Maintenance

[2]Services—inspect, test, service, adjust, align, calibrate, and/or replace.

[3]Fault locate/troubleshoot—The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[4]Disassemble/assembly—encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i. e., assigned as SMR code) for the category of maintenance under consideration.

[5]Actions—welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

[6]This maintenance level is not included in Section 11, column (4) of the Maintenance Allocation Chart. To identify functions to this level of maintenance, enter a work time figure in the "H" column of Section 11, column (4), and use an associated reference code in the Remarks column (6). Key the code to Section IV, Remarks, and explain the SRA complete repair application there. The explanatory remark(s) shall reference the specific Repair Parts and Special Tools List (RPSTL) TM which contains additional SRA criteria and the authorized spare/repair parts.

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number oft he tool or test equipment

e. Column 5, Tool Number. The manufacturer's part number,

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

a. Column 1, Reference Code The code recorded in column 6, Section II.

b. Column 2. Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART FOR M16/M16A1 RIFLE

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and EQPT	(6) Remarks
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
00	M16/M16A1 RIFLE	Inspect	0.1	0.2	0.3				
		Test			0.3			3	
		Service	0.2	0.3					
		Replace		0.1					
		*Overhaul							
01	BOLT CARRIER ASSEMBLY	Inspect	0.1	0.1	0.1				
		Test			0.1			3	
		Service	0.1	0.1					
		Remove/ Install	0.1						
		Replace			0.1				
		Repair		0.1	0.2			2	
0101	Bolt Assembly	Inspect	0.1	0.1	0.1				
		Test			0.1			3	
		Service	0.1	0.1					
		Remove/ Install	0.1						
		Replace			0.1				
		Repair		0.2	0.2			2	
0102	Key and Bolt Carrier Assembly	Inspect	0.1	0.1	0.1				
		Service	0.1						
		Replace			0.2			1,2	
		Repair		0.1	0.2			1,3	A
02	CHARGING HANDLE ASSEMBLY	Inspect	0.1	0.1					
		Service	0.1	0.1					
		Remove/ Install	0.1						
		Replace		0.1					
		Repair		0.1				2	

*Work items for Depot Overhaul are not included

Section II. MAINTENANCE ALLOCATION CHART FOR M16/M16A1 RIFLE (Continued)

(1)	(2)	(3)	(4) Maintenance Level					(5)	(6)
			Unit		Direct Support	General Support	Depot	Tools and EQPT	
Group Number	Component/ Assembly	Maintenance Function	C	O	F	H	D		Remarks
03	UPPER RECEIVER AND BARREL ASSEMBLY	Inspect	0.1	0.2	0.1				
		Test			0.2			2	
		Service	0.2	0.2					
		Remove/ Install	0.1						
		Replace			1.2			1,2,3,4	
		Repair		0.5	0.5			1,2,3	B
0301	Rifle Barrel Assembly	Replace			0.5				
		Remove/ Install			0.2			2,3,4	
0302	Upper Receiver Assembly	Inspect			0.1				
		Replace			0.5			2,3,4	
		Repair			0.3			3,4	
030201	Forward Assist Assembly	Inspect			0.1				
		Remove/ Install			0.2			3	
		Replace			0.2			3	
		Repair			0.2			3	
		Service			0.1			3	
04	LOWER RECEIVER AND EXTENSION ASSEMBLY	Inspect	0.1	0.2	0.2				
		Test			0.1			3	E
		Service	0.2	0.2					
		Repair		0.3	0.3			2,3,6	C
0401	Buttstock Assembly	Inspect		0.1					
		Remove/ Install		0.1				3	
		Replace			0.1			3	
		Repair		0.1				3	
		Service		0.1					
0402	Hammer Assembly	Inspect			0.1				
		Remove/ Install			0.1			3	
		Replace			0.1			3	
					0.1			3	

Section II. MAINTENANCE ALLOCATION CHART
FOR
M16/M16A1 RIFLE (Continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and EQPT	(6) Remarks
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0403	Trigger Assembly	Inspect			0.1			3	
		Remove/ Install			0.1				
		Replace			0.1			3	
		Repair			0.1			3	
0404	Lower Receiver and Extension Subassembly	Inspect			0.1				
		Test			0.1			3,6	
		Repair			0.3	0.1		3	D

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
M16/M16A1 RIFLE

(1) Tool/Test Equipment Ref. Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	F	Shop Set, Small Arms; Field Maintenance, Basic Less Power	4933-00-754-0664	SC 4933-95-CL-A11
2	F	Tool and Gage Set DS/GS Maintenance for 5.56mm Rifle, M16 Series	4933-00-056-7106	8426685
3	O,F	Tool Kit, Small Arms Repairman	5180-00-357-7770	SC 5180-95-CL-A07
4	F	Torque Wrench ft. lb	5120-00-640-6365	Part of Army Tool Set
5	F	Torque Wrench in. lb.	5120-00-230-6380	Part of Army Tool Set
6	F	Trigger Weights	4933-00-647-3696	Part of Army Tool Set

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Tool, Key
B	Tool, Sight Remover
C	Tool, Pivot Pin Removing
D	Only direct support level maintenance is authorized to restamp serial numbers
E	Lower Receiver Go-No Go Gage

APPENDIX C

UNIT AND DIRECT SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS)

section I. INTRODUCTION

C-1. SCOPE. This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of unit and direct support maintenance of the rifle. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools indicated by the Source, Maintenance, and Recoverability (SMR) codes.

C-2. **GENERAL. In** addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. **Section II. Repair Parts List.** A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed by item name in FIG. BULK at the end of the section. Repair parts kits are listed separately in their own functional group within section II. Repair parts for repairable special tools are also listed in this section. Items listed are shown on the associated illustration(s)/figure(s).

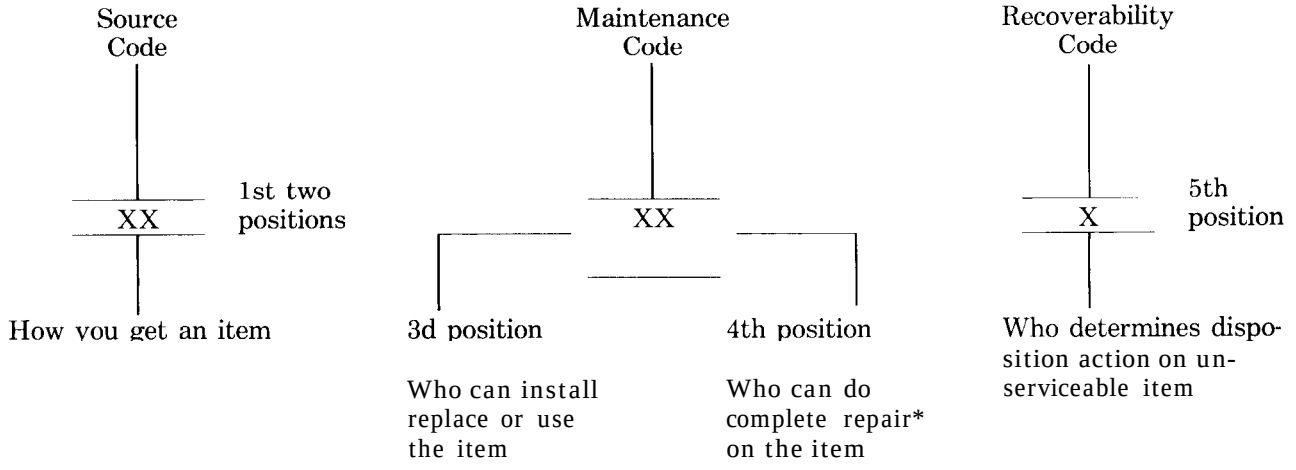
b. Section III. **Special Tools List.** A list of special tools, special TMDE, and other special support, equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE column) for the performance of maintenance.

c. Section **IV. Cross-Reference Index.** A list, in National item identification number (NIIN) sequence, of all National stock numbered items appearing in the listing, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance. The figure and item number index lists figure and item numbers in alphanumeric sequence and cross-references NSN, FSCM and part numbers.

C-3. **EXPLANTION OF COLUMNS (SECTIONS II AND III).**

a. ITEM NO. (Column (l)). Indicates the number used to identify items called out in the illustration.

b. SMR Code (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instructions, as shown in the following breakout.



*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follows:

Code	Explanation
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the level indicated by the code entered in the 3d position of the SMR code. **NOTE. Items coded PC are subject to deterioration.
KD KF KB	Items with these codes are not to be requested /requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.
MO - (Made at Unit AVUM Level) MF - (Made at DS/AVIM Level) MH - (Made at GS Level) ML - (Made at Specialized Repair Act (SRA) MD - (Made at Depot)	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3d position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.

Code	Explanation
AO - (Assembled by unit/ AVUM Level) AF - (Assembled by DS/AVIM Level) AH - (Assembled by GS Level) AL - (Assembled by SRA) AD - (Assembled by Depot)	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitiond or fabricated and assembled at the level of maintenance indicated by the source code. If the 3d position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.

XA - Do not requisition an "XA' '-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)
XB - If an "XB" item is not available from salvage, order it using the FSCM and part number given.
XC - Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD - Item is not stocked. Order am "XD' '-coded item through normal supply channels using the FSCM and part number given, if no NSN is available.

NOTE: Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted **by** requirements of AR 700-42.

(2) Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows

(a) The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

Code	Application/Explanation
C	Crew or operator maintenance done within unit or aviation unit maintenance.
O	Unit or aviation unit level can remove, replace, and use the item.
F	Direct support or aviation level can remove, replace and use the item.
H	General support level can remove, replace, and use the item.
L	Specialized repair activity can remove, replace, and use the item.
D	Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions). (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.) This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	Unit or aviation unit is the lowest level that can do complete repair of the item.
F	Direct support or aviation is the lowest level that can do complete repair of the item.
H	General support is the lowest level that can do complete repair of the item.
L	Specialized repair activity (designate the specialized repair activity) is the lowest level that can do complete repair of the item.
D	Depot is the lowest level that can do complete repair of the item.
Z	Nonreparable. No repair is authorized.
B	No repair is authorized. No parts or special tools are authorized for the maintenance of a "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

Recoverability Code	Application/Explanation
Z	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR Code.
O	Reparable item. When uneconomically reparable, condemn and dispose of the item at unit or aviation unit level.
F	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation level.
H	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
A	Item requires special handling or condemnation procedures because of specific reasons (e.g., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. FSCM (Column (3)). The Federal Supply Code for Manufacturer (FSCM) is a **5-digit** numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

d. PART NUMBER (Column (4)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE: When you use a NSN to requisition an item, the item you receive may have a different part number from the part ordered.

e. DESCRIPTION AND USABLE ON CODE (UOC) (Column (5)). **This column includes the** following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry.

(3) NSNs for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.

(4) When the item is not used with all serial numbers of the same model, the effective serial numbers are shown on the last lines of the description (before UOC).

(5) The usable on code, when applicable (see paragraph C-5, special information).

(6) In the Special Tools List section, the basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased proportionately.

(7) The statement "END OF FIGURE" appears just below the last item description in column 5 for a given figure in both section II and section III

f. QTY (Column (6)). The QTY (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and the quantity may vary from application to application.

C-4. EXPLANATION OF COLUMNS (SECTION IV).

a. National Stock Number (NSN) Index.

(1) STOCK NUMBER column. This column lists the NSN by National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN (i.e., 5385-01-574-1476). When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) **FIG. column.** This column lists the number of the figure where the item is identified/located. The figures are in numerical order in section II and section III.

(3) ITEM column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. PART NUMBER INDEX. Part numbers in this index are listed by part number in ascending alpha-numeric sequence (i.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers O through 9 and each following letter or digit in like order).

(1) FSCM column. The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(2) PART NUMBER column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identity an item or range of items.

(3) STOCK NUMBER column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and FSCM columns to the left.

(4) FIG. column. This column lists the number of the figure where the item is identified/located in sections II and III.

(5) ITEM column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

c. Figure and Item Number Index.

(1) FIG. column. This column lists the number of the figure where the item is identified/located in section II and III.

(2) ITEM column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

(3) STOCK NUMBER column. This column lists the NSN for the item.

(4) FSCM **column. The** Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(5) PART NUMBER column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify item or range of items.

C-5. SPECIAL INFORMATION.

a. Usable on Code. The usable on code appears in the lower left comer of the DESCRIPTION column heading. Usable on codes are shown as "UOC..." in DESCRIPTION column (justified left) on the first line applicable item description/nomenclature. Uncoded items are applicable to all models. Identification of the usable on codes used in the RPSTL are:

Code	Used On
755	M16
194	M16A1

b. Assembly Instructions. Detailed assembly instructions for items source coded to be assembled from component spare/repair parts are found in chapter 3. Items that make up the assembly are listed immediately following the assembly item entry or reference is made to an applicable figure.

c. Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number/Part Number index and the bulk material list in section II.

C-6. HOW TO LOCATE REPAIR PARTS.

a. When National Stock Number or Part Number is Not Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure and note the item number.

(4) **Fourth.** Refer to the Repair Parts List for the figure to find the part number for the item number noted on the figure.

(5) **Fifth.** Refer to the Part Number Index to find the NSN, if assigned.

b. When National Stock Number or Part Number is Known.

(1) First. Using the index of National stock numbers and part numbers, find the pertinent National stock number or part number. The NSN index is in National Item Identification Number (N I IN) sequence (see C-4a(l)). The part numbers in the PART NUMBER INDEX are listed in ascending alphanumeric sequence (see C-4b). Both indexes cross-reference you to the illustration/figure and item number of the item you are looking for.

(2) **Second.** Turn to the figure and item number, verify that the item is the one you're looking for, then locate the item number in the repair parts list for the figure.

C-7. **ABBREVIATIONS.** Not applicable.

Section II. REPAIR PARTS LIST

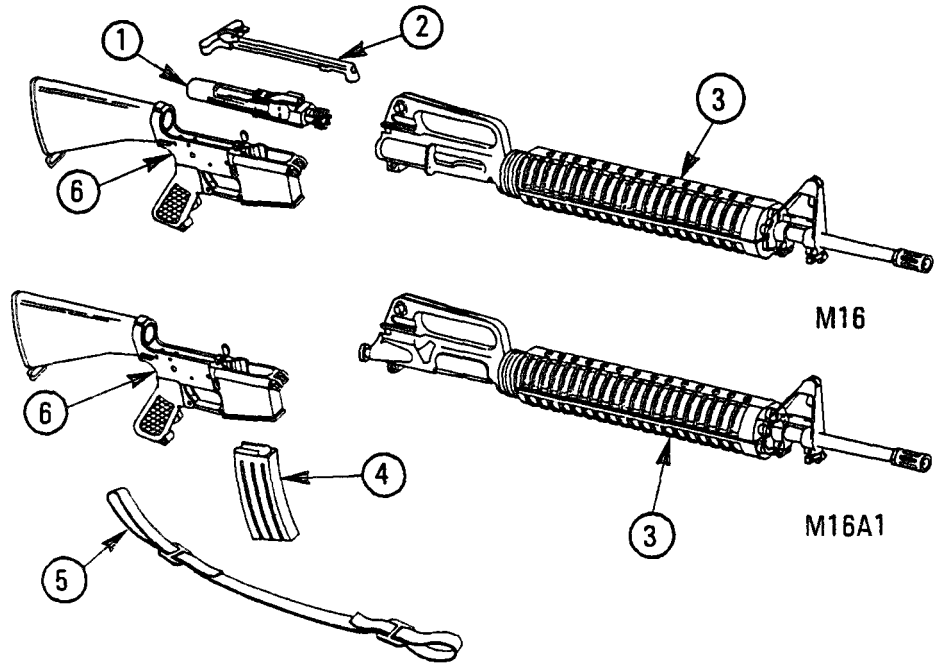


Figure C-1. 5. 5 6MM *Rifle M16. 8448600 and M16A1. 8448500.*

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART Number	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 00 FIG C-1 5.56MM RIFLE M16 (8448600) AND M16A1 (8448500)	
1	AFFFF	19204	8448501	BOLT CARRIER ASSEMBLY (SEE FIG.C-2 FOR BREAKDOWN)	1
2	PAOOO	19204	8448517	HANDLE ASSEMBLY, CHARGING (SEE FIG C-5 FOR BREAKDOWN)	1
3	AFFFF	19204	8448601	UPPER RECEIVER AND BARREL ASSEMBLY, M16, (SEE FIG.C-6 FOR BREAKDOWN) UOC:755	1
3	AFFFF	19204	8448522	UPPER RECEIVER AND BARREL ASSEMBLY, M16A1 (SEE FIG.C-6 FOR BREAKDOWN) . . . UOC:194	1
4	PACZZ	19200	8448670	MAGAZINE,CARTRIDGE	1
5	PACZZ	19204	12624561	SLING,SMALL ARMS	1
6	XAFFA	19204	8448604	LOWER RECEIVER AND EXTENSION ASSY, M16 (SEE FIG C-10 FOR BREAKDOWN) UOC:755	1
6	XAFFA	19204	8448578	LOWER RECEIVER AND EXTENSION ASSY, M16A1 (SEE FIG C-10 FOR BREAKDOWN). . UOC:194	1
				END OF FIGURE	

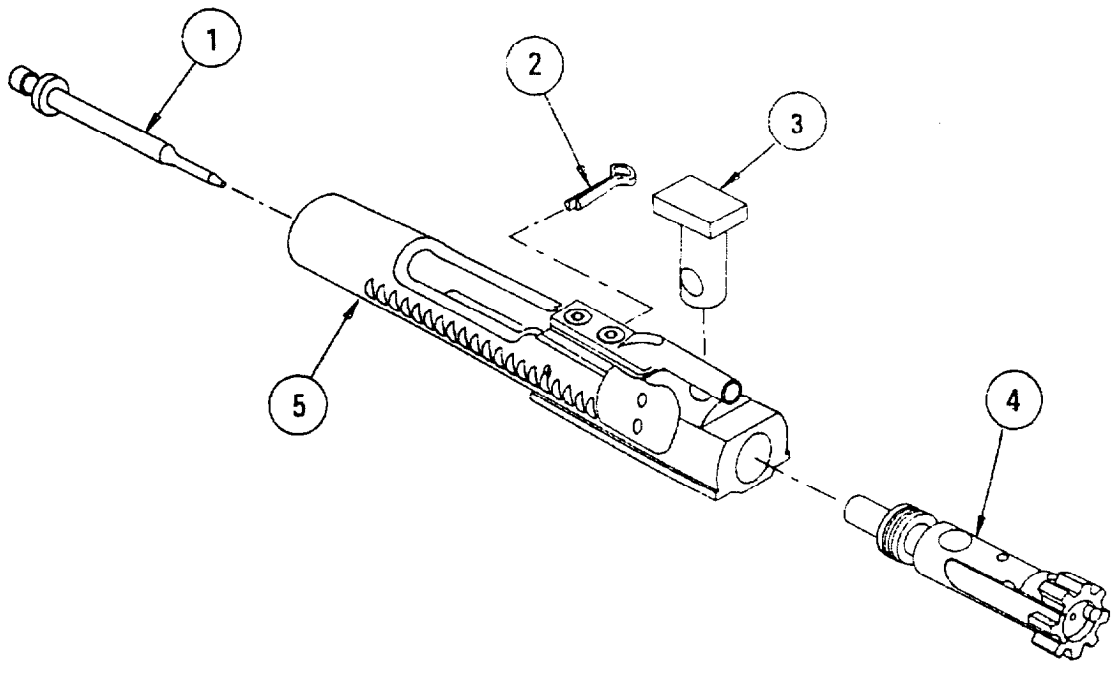


Figure C-2. Bolt Carrier Assembly 8448501.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 01 FIG C-2 BOLT CARRIER ASSEMBLY 8448501	
1	PAFZZ	19204	8448503	PIN,FIRING	1
2	PAOZZ	19204	8448504	PIN,FIRING PIN RETAINING	1
3	PAOZZ	19204	8448502	PIN,GROOVED,HEADED	1
4	PAFFF	19200	8448509	BOLT ASSEMBLY (SEE FIG C-3 FOR BREAKDOWN)	1
5	AFFFF	19204	8448505	KEY AND BOLT CARRIER ASSEMBLY (SEE FIG. C-4 FOR BREAKDOWN)	1
				END OF FIGURE	

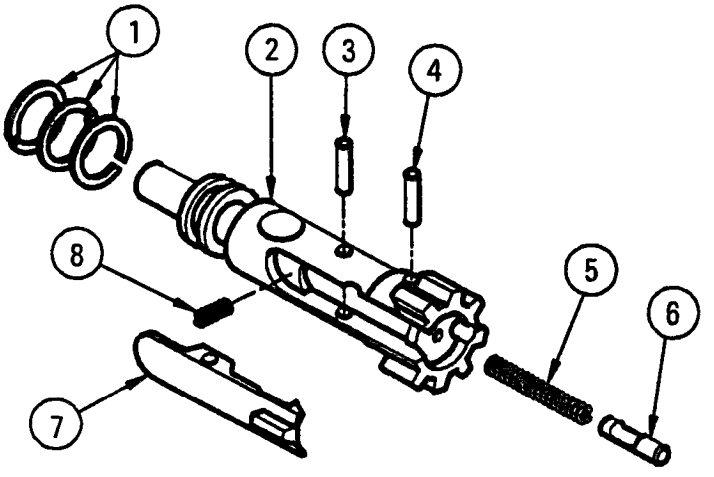


Figure **C-3.** *Bolt Assembly 8448509.*

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0101 FIG C-3 BOLT ASSEMBLY 8448509	
1	PAFZZ	19204	8448511	RING,BOLT	3
2	XAFZZ	19204	8448510	BOLT	1
3	PAOZZ	19204	8448513	PIN,EXTRACTOR	1
4	PAOZZ	96906	MS16562-98	PIN,SPRING	1
5	PAOZZ	19204	8448516	SPRING,HELICAL	1
6	PAOZZ	19204	8448515	EJECTOR,CARTRIDGE	1
7	PAOZZ	19204	8448512	EXTRACTOR,CARTRIDGE	1
8	PAOZZ	19200	8448755	SPRING ASSEMBLY,EXT EXTRACTOR	1
				END OF FIGURE	

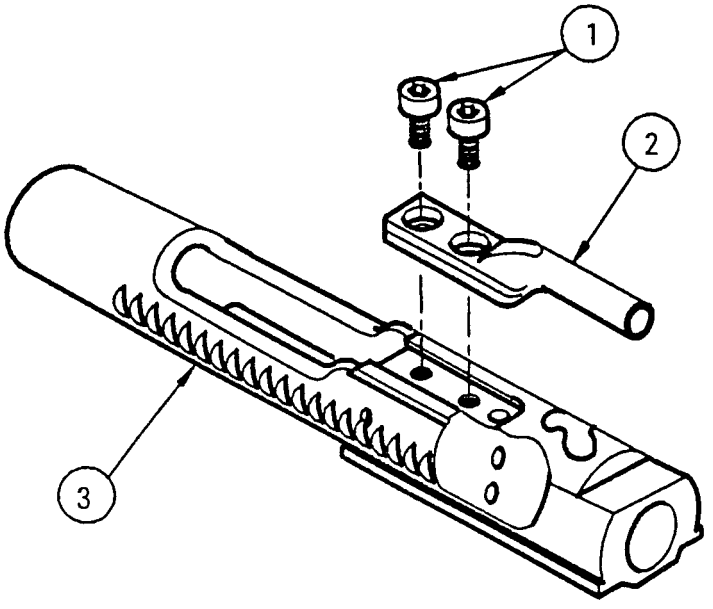


Figure C-4. Key and Bolt Carrier Assembly 8448505.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0102 FIG C-4 KEY AND BOLT CARRIER ASSEMBLY 8448505	
1	PAFZZ	19204	8448508	SCREW,CARRIER AND KEY	2
2	PAFZZ	19200	8448506	KEY,BOLT CARRIER	1
3	PAFZZ	19200	8448507	CARRIER,BOLT	1
				END OF FIGURE	

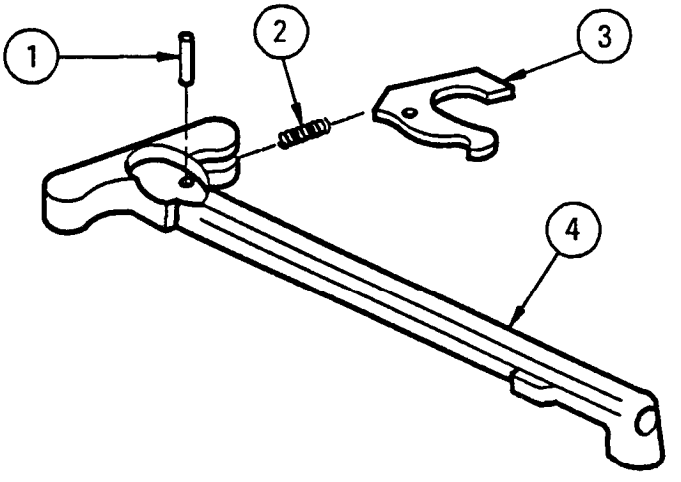


Figure C-5. Charging Handle Assembly 8448517.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 02 FIG C-5 CHARGING HANDLE ASSEMBLY 8448517	
1	PAOZZ	13629	8448521-2	PIN,SPRING	1
2	PAOZZ	19204	8448520	SPRING,HELICAL	1
3	PAOZZ	19200	8448519	LATCH,CHARGING HANDLE	1
4	XAOZZ	19204	8448518	HANDLE	1
				END OF FIGURE	

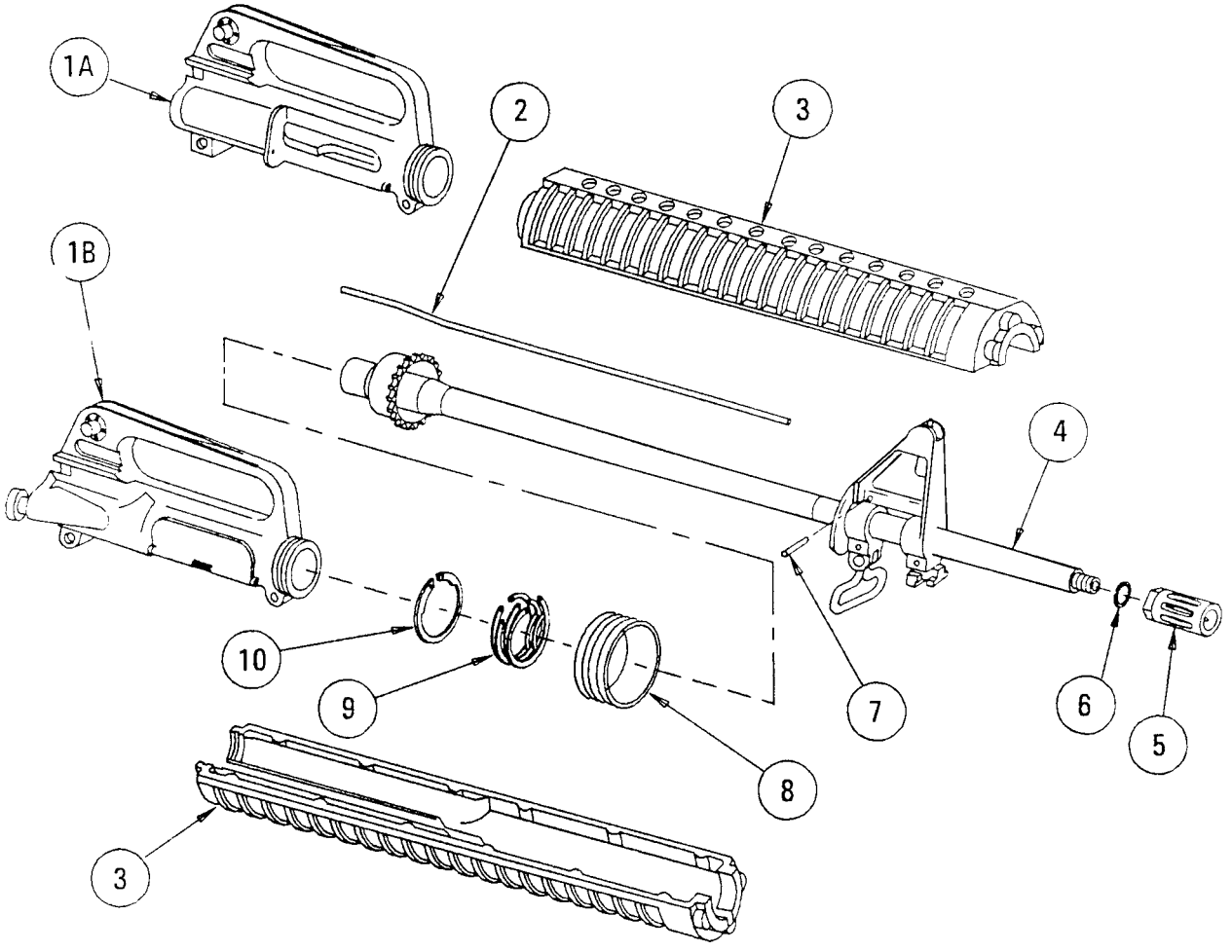


Figure C-6. Upper Receiver and Barrel Assembly M16, 8448601 and M16A1, 8448522.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 03 FIG C-6 UPPER RECEIVER AND BARREL ASSEMBLY M16 (8448601) AND M16A1 (8448522)	
1	AFFFF	19204	8448602	UPPER RECEIVER ASSY,M16 (SEE FIG.C-8 FOR BREAKDOWN) UOC:755	1
1	AFFFF	19204	8448523	UPPER RECEIVER ASSY,M16A1 (SEE FIG.C-8 FOR BREAKDOWN) UOC:194	1
2	PAFZZ	19200	8448567	TUBE,GAS	1
3	PAOZZ	19200	9349059	HANDGUARD ASSEMBLY	2
4	PAFFF	19204	8448663	BARREL ASSEMBLY, RIFLE (SEE FIG C-7 FOR BREADKDOWN)	1
5	PAFZZ	19204	8448576	SUPPRESSOR,FLASH	1
6	PAFZZ	19204	8448577	WASHER,LOCK,FLASH SUPPRESSOR	1
7	PAFZZ	96906	MS16562-106	PIN,SPRING	1
8	PAFZZ	19204	8448712	RING,SLIP,HAND GUAR GUARD	1
9	PAFZZ	19204	8448712	SPRING, SLIP RING, HANDGUARD	1
10	PAFZZ	96906	MS16626-1137	RING,RETAINING EXT, TAPERED SECTION	1
				END OF FIGURE	

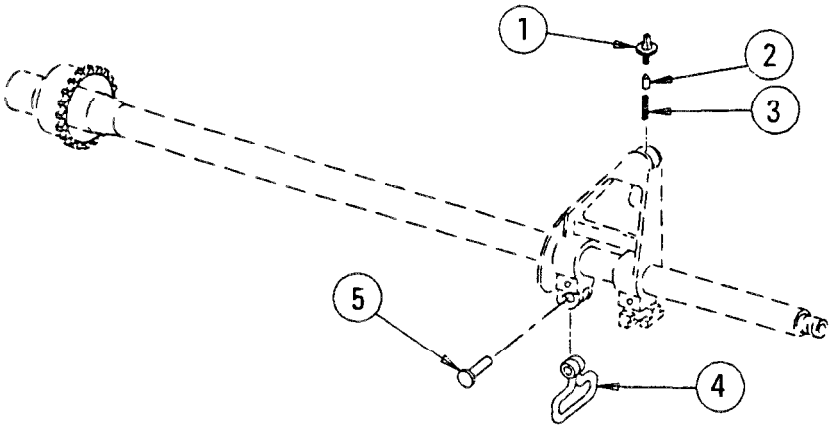


Figure C-7. Rifle Barrel Assembly 8448663.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0301 FIG C-7 RIFLE BARREL ASSEMBLY 8448663	
1	PAOZZ	19200	9349056	POST,FRONT SIGHT	1
2	PAOZZ	19204	8448573	DETENT,FRONT SIGHT	1
3	PAOZZ	19204	8448574	SPRING,HELICAL	1
4	PAOZZ	19204	8448571	SWIVEL, SLING,SMALL	1
5	PAOZZ	19204	8448697	RIVET,TUBULAR	1
				END OF FIGURE	

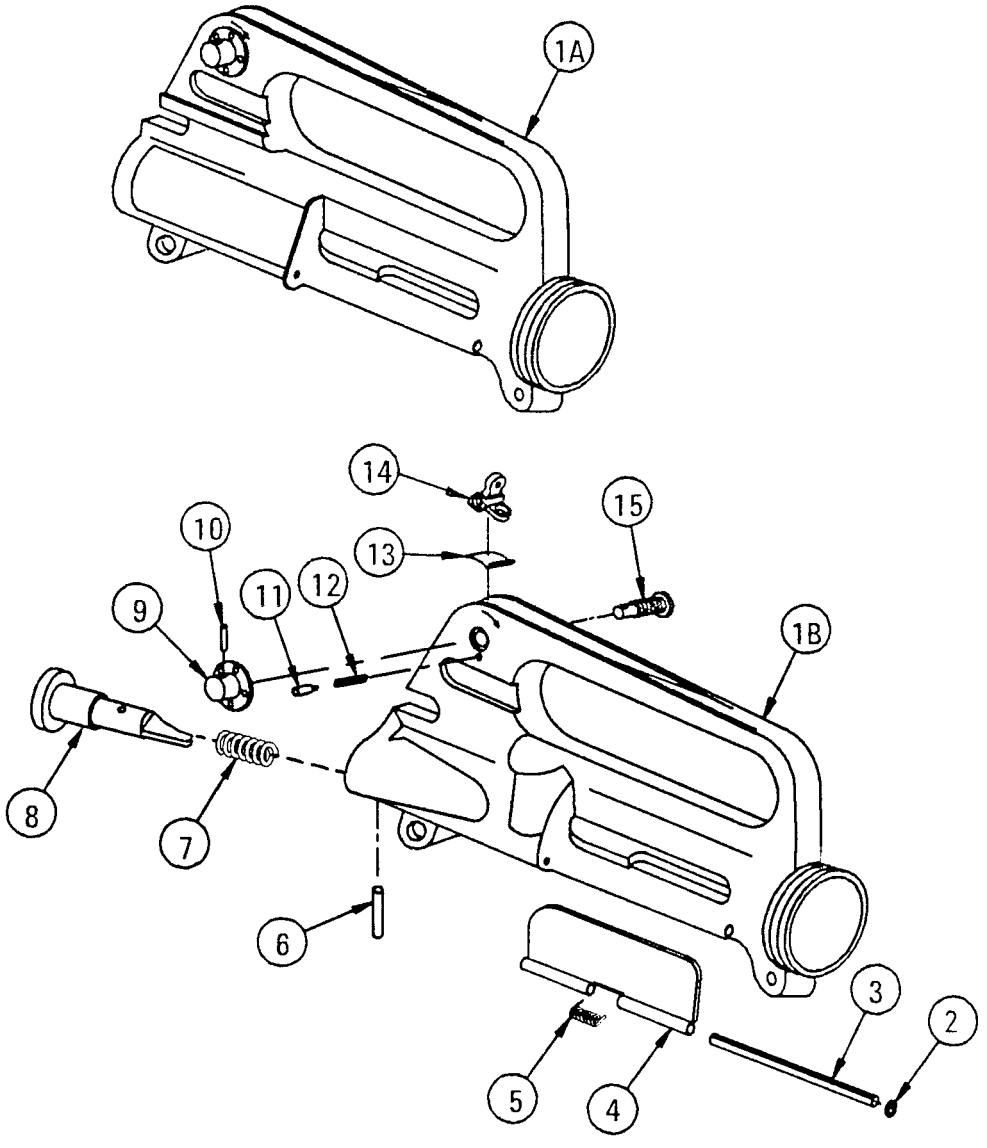


Figure C-8. Upper Receiver Assembly M16, 8448602 and M16A1, 8448523.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0302 FIG C-8 UPPER RECEIVER ASSEMBLY M16 (8448602) AND M16A1 (8448523)	
1	PAFZZ	19204	8448603	RECEIVER,UPPER M16 UOC:755	1
1	PAFZZ	19200	12576280	RECEIVER,CARTRIDGE M16A1 UOC:194	1
2	PAOZZ	96906	MS16632-1012	RING,RETAINING	1
3	PAOZZ	19204	8448533	PIN,GROOVED,HEADLES COVER	1
4	PAOZZ	19204	8448525	COVER,EJECTION	1
5	PAOZZ	19204	8448532	SPRING,HELICAL	1
6	PAFZZ	96906	MS16562-121	PIN,SPRING (FORWARD ASSIST PIN) UOC:194	1
7	PAFZZ	19200	8448540	SPRING,HELICAL,COMP COMPRESSION UOC:194	1
8	AFFFF	19204	9349086	FORWARD ASSIST ASSY (SEE FIG.C-9 FOR BREAKDOWN) UOC:194	1
9	PAFZZ	19200	8448535	DIAL,CONTROL WINDAGE	1
10	PAFZZ	96906	MS16562-96	PIN,SPRING	1
11	PAFZZ	19200	8448537	DETENT,REAR SIGHT	1
12	PAFZZ	19200	8448538	SPRING,HELICAL,COMP COMPRESSION	1
13	PAFZZ	19200	8448536	SPRING,FLAT	1
14	PAFZZ	19204	8448539	APERTURE SIGHT	1
15	PAFZZ	19204	8448534	SCREW,REAR SIGHT WINDAGE	1
				END OF FIGURE	

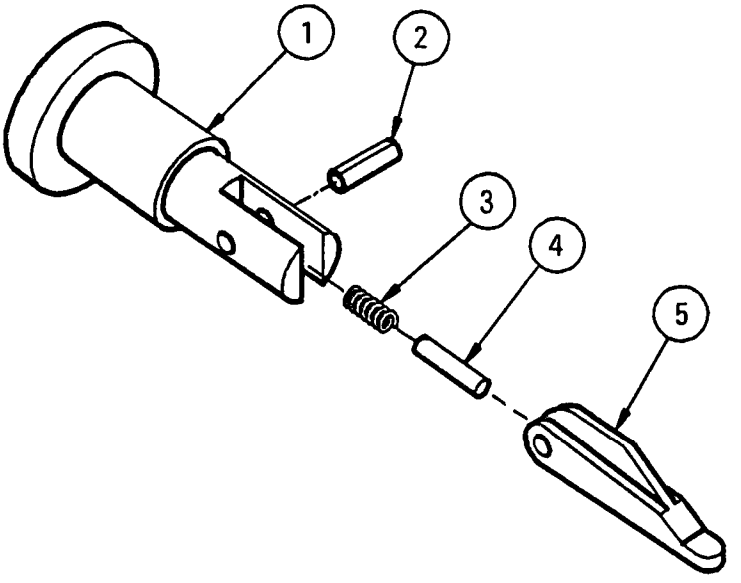
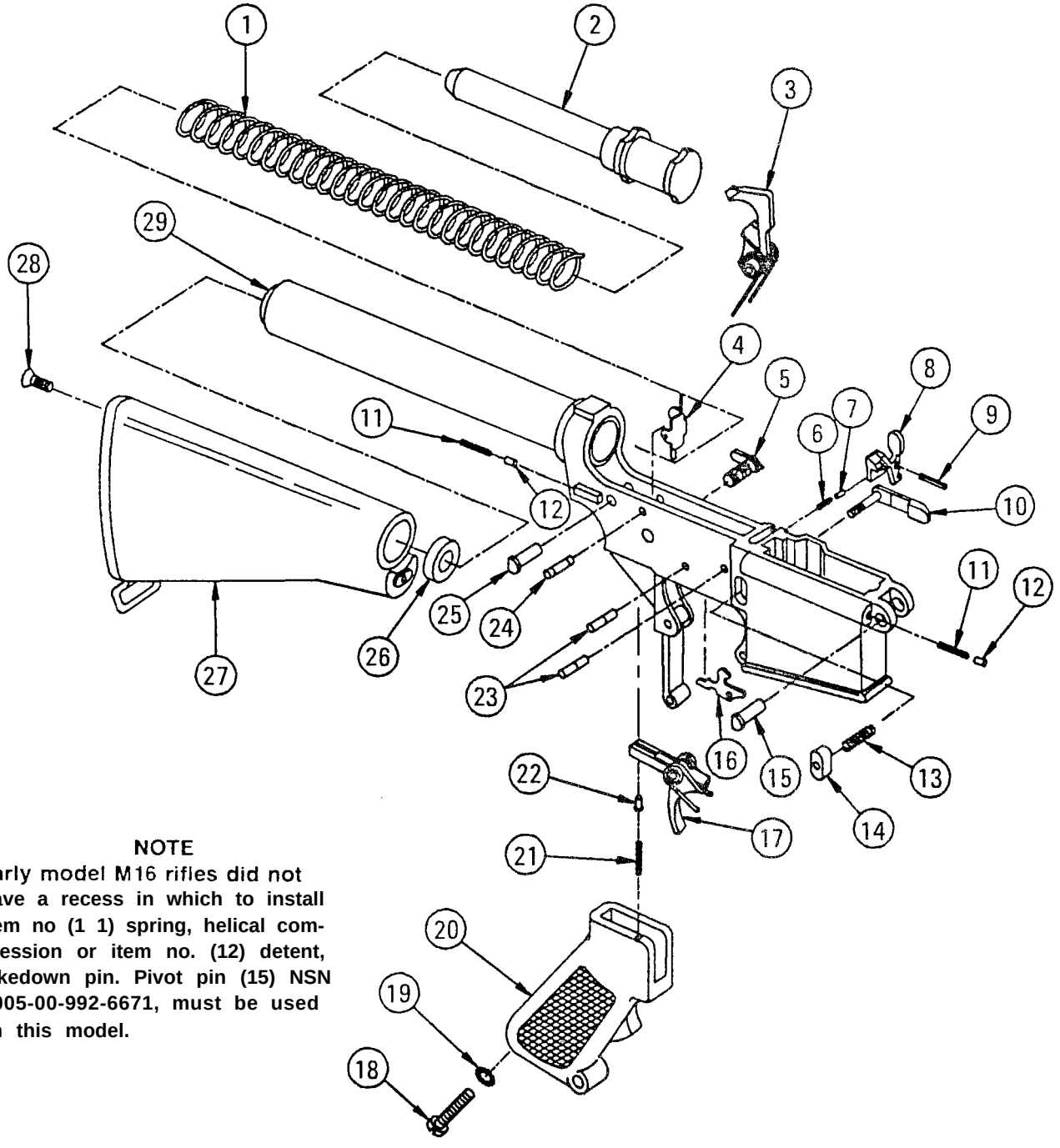


Figure C-9. Forward Assist Assembly M16A1, 9349086.

(1) ITEM NO	*(2)* SMR CODE	*(3)* CAGEC	*(4)* PART NUMBER	*(5)* DESCRIPTION AND USABLE ON CODES (UOC)	*(6)* QTY
				GROUP 030201 FIG C-9 FORWARD ASSIST ASSEMBLY M16Al (9349086)	
1	PAFZZ	19200	9349085	PLUNGER ASSEMBLY UOC:194	1
2	PAFZZ	13629	95113	PIN,SPRING , FORWARD ASSIST PAWL... UOC:194	1
3	PAFZZ	19200	8448542	SPRING,HELICAL,COMP COMPRESSION UOC:194	1
4	PAFZZ	19204	8448544	DETENT,PAWL UOC:194	1
5	PAFZZ	19204	8448543	PAWL,FORWARD ASSIST UOC:194	1
				END OF FIGURE	



NOTE

Early model M16 rifles did not have a recess in which to install item no (1 1) spring, helical compression or item no. (12) detent, takedown pin. Pivot pin (15) NSN 1005-00-992-6671, must be used on this model.

Figure C-10. Lower Receiver and Extension Assembly M16, 8448604 and M16A1, 8448578.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 04 FIG C-10 LOWER RECEIVER AND EXTENSION ASSEMBLY M16 (8448604) AND M16A1 (8448578)	
1	PAOZZ	19204	8448629	SPRING,HELICAL, COMPRESSION	1
2	PAOZZ	19200	8448615	BUFFER ASSEMBLY	1
3	AFFFF	19204	8448610	HAMMER ASSY (SEE FIG.C-12 FOR BREAKDOWN)	1
4	PAFZZ	19200	8448595	SEAR AUTOMATIC ASSEMBLY	1
5	PAFZZ	19204	8448630	LEVER,SELECTOR	1
6	PAFZZ	19204	8448633	SPRING,HELICAL, COMPRESSION	1
7	PAFZZ	19204	8448634	PLUNGER,BOLT CATCH	1
8	PAFZZ	19200	8448628	CATCH,BOLT	1
9	PAFZZ	96906	MS16562-119	PIN,SPRING STEEL	1
10	PAFZZ	19204	8448638	CATCH,MAGAZINE	1
11	PAOZZ	19204	8448586	SPRING,HELICAL, COMPRESSION	2
12	PAOZZ	19204	8448585	PIN,STRAIGHT,HEADLE PIN	2
13	PAFZZ	19204	8448637	SPRING,HELICAL, COMPRESSION	1
14	PAFZZ	19204	8448636	BUTTON,MAGAZINE CAT CATCH	1
15	PAOZZ	19204	8448621	PIN,PIVOT	1
15	PAOZZ	13629	95601	PIN,PIVOT (SEE NOTE ON FIG C-10) UOC:755	1
16	PAFZZ	19200	8448635	DISCONNECTOR	1
17	AFFFF	19204	8448591	TRIGGER ASSY (SEE FIG.C-13 FOR BREAKDOWN)	1
18	PAOZZ	88044	AN501D416-18	SCREW,MACHINE,FILLI	1
19	PAOZZ	96906	MS35335-61	WASHER,LOCK	1
20	PAOZZ	19200	9349127	GRIP,RIFLE PLASTIC,BLACK	1
21	PAOZZ	19204	8448516	SPRING,HELICAL, COMPRESSION	1
22	PAOZZ	19204	8448631	DETENT,SAFETY	1
23	PAFZZ	19204	8448609	PIN,GROOVED,HEADLES TRIGGER	2
24	PAFZZ	19204	8448599	PIN,GROOVED,HEADLES	1
25	PAOZZ	19204	8448584	PIN,TAKEDOWN	1
26	PROZZ	19200	9349129	SPACER,STEPPED	1
27	PAOOO	19200	9349119	BUTTSTOCK ASSEMBLY	1
28	PAOZZ	19200	9349128	SCREW,SELF-LOCKING	1
29	XAFFA	19204	8448605	LOWER RECEIVER, AND EXTENSION SUBASSEMBLY, M16 (SEE FIG C-14 FOR BREAKDOWN) UOC:755	1
29	XAFFA	19204	8448579	LOWER RECEIVER AND EXTENSION SUBASSEMBLY, M16A1 (SEE FIG C-14 FOR BREAKDOWN) UOC:194	1
				END OF FIGURE	

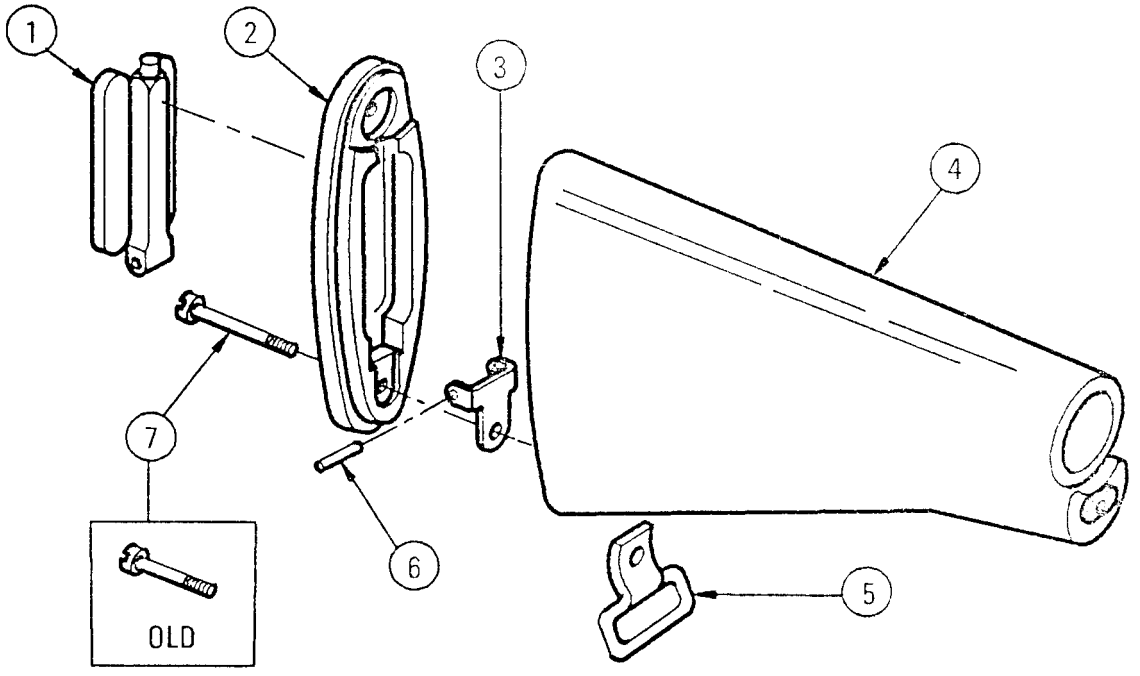


Figure C-11. Buttstock Assembly 9349119

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0401 FIG C-11 BUTTSTOCK ASSEMBLY 9349119	
1	PAOZZ	19200	9381380	DOOR ASSEMBLY,THUMB	1
2	PAOZZ	19200	9349130	PLATE,BUTT, SHOULDER	1
3	PAOZZ	19200	8448653	HINGE,ACCESS DOOR ACCESS DOOR BUTT PLATE	1
4	XAOZZ	19200	9349121	BUTTSTOCK	1
5	PAOZZ	19204	8448652	SWIVEL, SLING, SMALL	1
6	PAOZZ	19204	8448655	PIN,STRAIGHT, HEADLESS	1
7	PAOZZ	19200	9349120	SCREW, SELF-LOCKING	1

END OF FIGURE

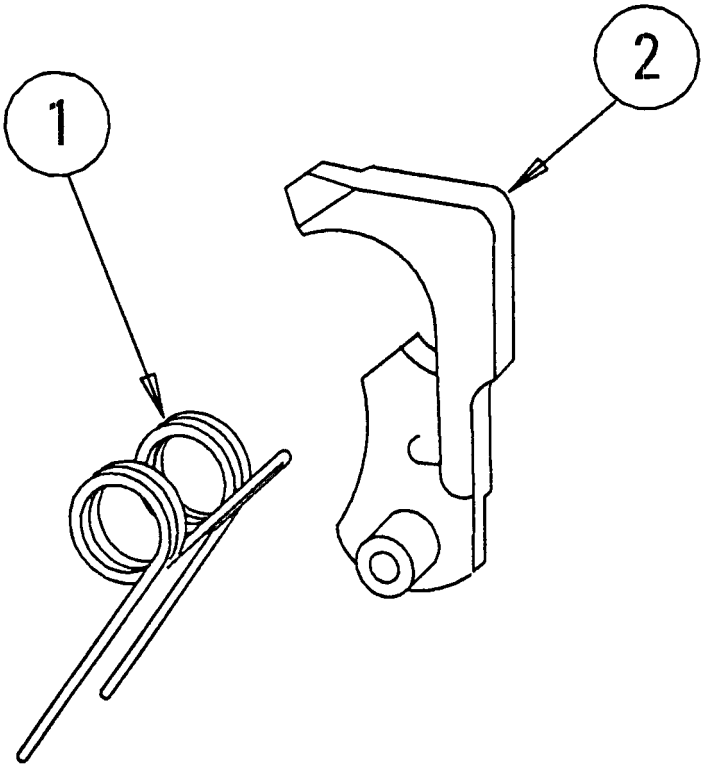


Figure C-12. Hammcr Assembly 8448610.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0402 FIG C-12 HAMMER ASSEMBLY 8448610	
1	PAFZZ	19204	8448611	SPRING,HELICAL, TORSION	1
2	PAFZZ	19200	8448612	HAMMER,FIRING,SMALL	1
				END OF FIGURE	

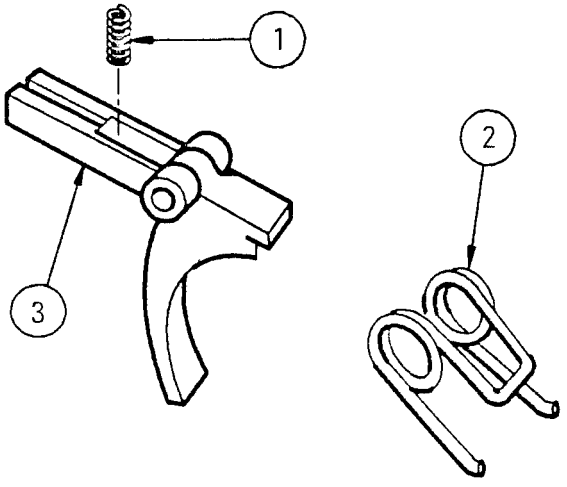


Figure C- 13. *Trigger Assembly 8448591.*

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES(UOC)	(6) QTY
				GROUP 0403 FIG C-13 TRIGGER ASSEMBLY 8448591	
1	PAFZZ	19200	8448594	SPRING,HELICAL,COMP COMPRESSION	1
2	PAFZZ	19204	8448593	SPRING,HELICAL , TORSION	1
3	PAFZZ	19204	8448592	TRIGGER	1
				END OF FIGURE	

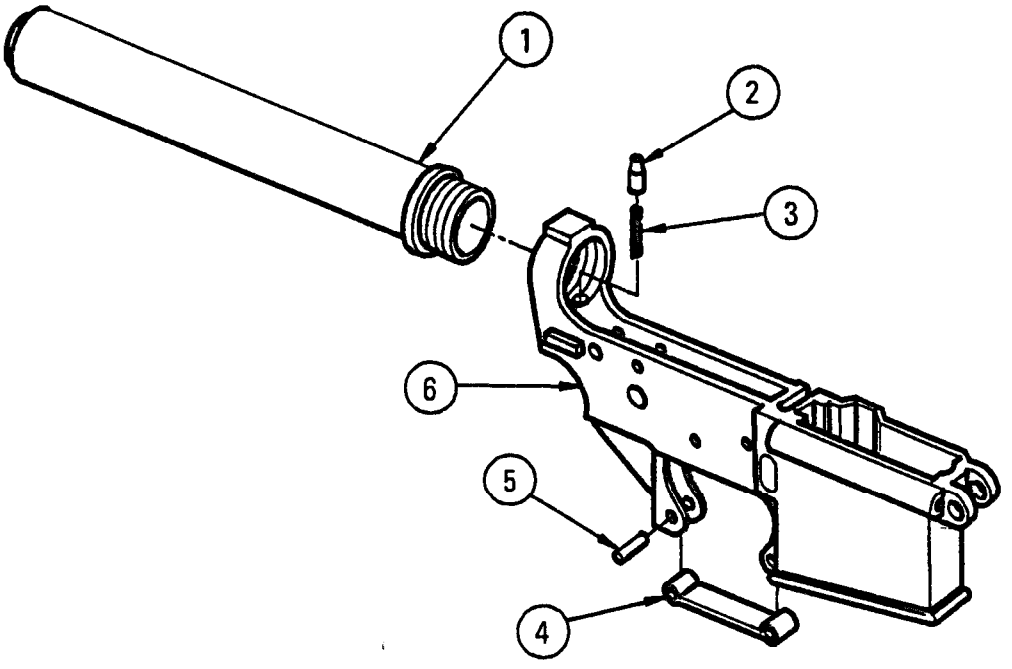


Figure C-14. Lower Receiver and Extension Subassembly M16, 8448605 and M16A1, 8448579.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0404 FIG C-14 LOWER RECEIVER AND EXTENSION SUBASSEMBLY M16 (8448605) AND M16Al (8448579)	
1	PAFZZ	19200	8448581	HOLDER,SPRING RECEIVER	1
2	PAFZZ	19204	8448582	PIN,SHOULDER,HEADLE	1
3	PAFZZ	19200	8448583	SPRING,HELICAL,COMP COMPRESSION	1
4	PAFZZ	19204	8448587	GUARD,TRIGGER	1
5	PAFZZ	96906	MS16562-35	PIN,SPRING	1
6	XAFDD	19204	8448606	RECEIVER, LOWER NOTE: SERIAL NUMBER CONTROL M16 . . . . . UOC:755	1
6	XAFDD	19204	8448580	RECEIVER, LOWER NOTE: SERIAL NUMBER CONTROL M16A1 . . . . . UOC:194	1
				END OF FIGURE	

Section III. SPECIAL TOOLS LIST

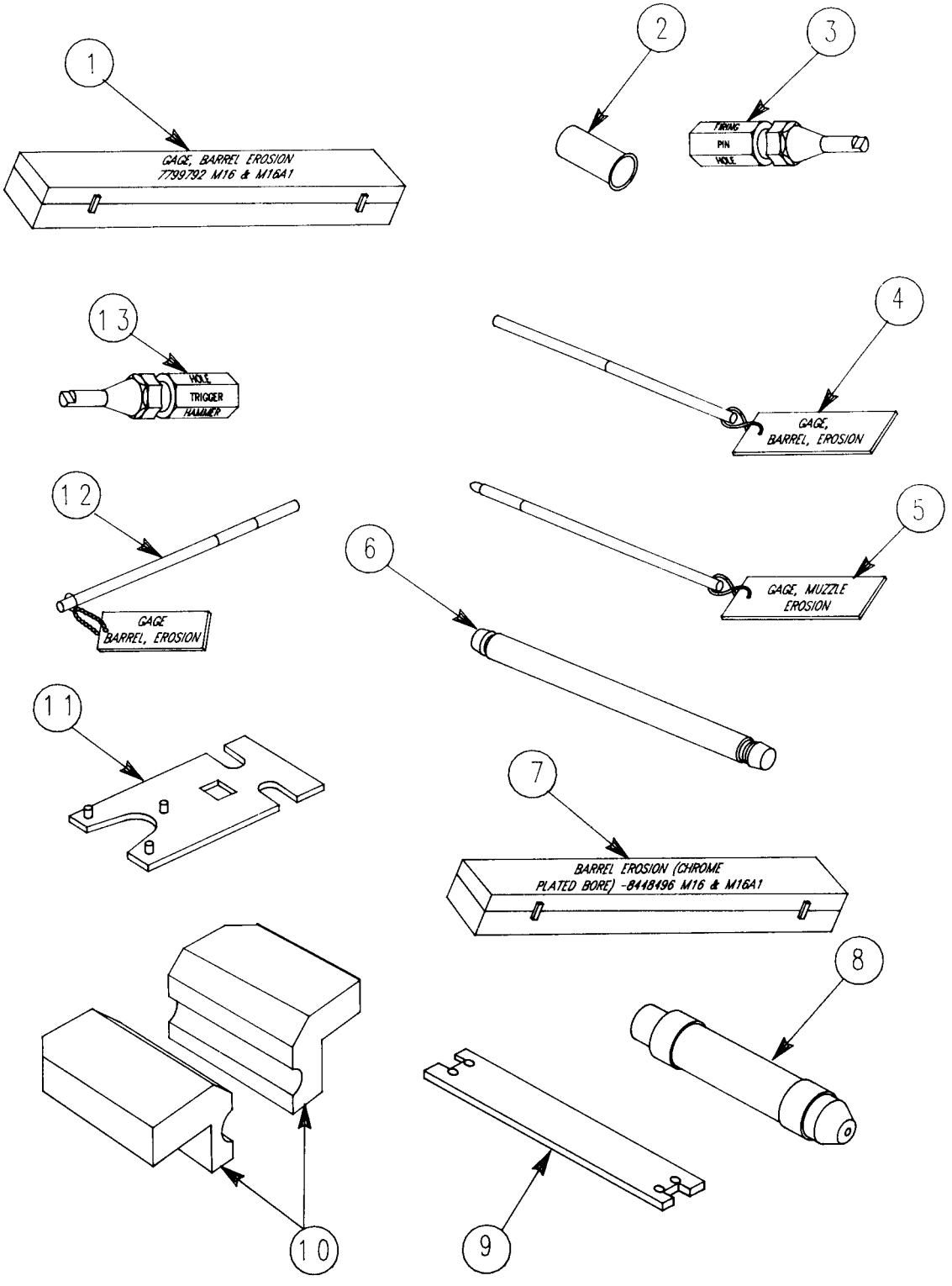


Figure C-15. Special tools.

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 9500 FIG C-15 SPECIAL TOOLS	
1	ADFFA	19204	8426685	TOOL AND GAGE SET DS/GS SUPPORT MAINTENANCE FOR 5.56MM RIFLE M16 RIFLE SERIES BOI: 2 PER SUPPORTING DSU/GSU	
1	PAFZZ	19205	7799809	..CASE,CARRYING,GAGE PART OF KIT P/N 8426685 (M16 ONLY)	
2	PAFZZ	19204	8448201	..REFLECTOR TOOL, CHAMBER,PART OF KIT P/N 8426685	
3	PAFZZ	19200	12620101	..GAGE,PLUG,PLAIN PART OF KIT P/N 8426685	
4	PAFZZ	19204	8448496	..GAGE,BARREL,EROSION PART OF KIT P/N 8426685 (CHROME BARREL)	
5	PAFZZ	19204	8448677	..GAGE,MUZZLE EROSION PART OF KIT P/N 8426685 (NON-CHROME BARREL)	
6	PAFZZ	19204	8448202	..GAGE,STRAIGHTNESS PART OF KIT P/N 8426685	
7	PAFZZ	19204	12006359	..CASE,BORE GAGE PART OF KIT P/N 8426685	
8	PAFZZ	19204	7799734	..GAGE,HEADSPACE PART OF KIT P/N 8426685	
9	PAFZZ	19204	7799735	..GAGE,FIRING PIN PROTRUSION PART OF KIT P/N 8426685	
10	PAFZZ	19204	11010032	..FIXTURE,BARREL REMOVAL PART OF KIT P/N 8426685	
11	PAFZZ	19204	11010033	..WRENCH,COMBINATION PART OF KIT P/N 8426685	
12	PAFZZ	19205	7799792	..GAGE,BARREL EROSION PART OF KIT P/N 8426685 (NON-CHROME BARREL)	
13	PAFZZ	19204	12006472	..GAGE,PLUG,TAPER CYLINDER PART O KIT P/N 8426685	
				END OF FIGURE	

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5315-00-017-9537	C-10	15	5360-00-979-3931	C-7	3
3040-00-017-9539	C-9	5	5360-00-992-6648	C-12	1
1005-00-017-9540	C-9	4	1005-00-992-6649	C-10	4
5360-00-017-9541	C-8	7	5315-00-992-6650	C-10	24
1005-00-017-9543	C-7	4	5315-00-992-6651	C-14	2
1005-00-017-9546	C-1	2	5360-00-992-6652	C-14	3
1005-00-017-9547	C-2	1	5315-00-992-6653	C-10	25
1005-00-017-9548	C-10	8	5315-00-992-6654	C-10	12
1005-00-017-9551	C-12	2	5360-00-992-6655	C-10	11
5315-00-017-9552	C-9	2	5360-00-992-6665	C-10	1
1005-00-056-2201	C-10	10	5340-00-992-6666	C-10	5
5360-00-056-2246	C-10	6	1005-00-992-6667	C-10	22
1005-00-056-2247	C-10	7	1005-00-992-6671	C-10	15
5315-00-058-6044	C-6	7	1005-00-992-7280	C-6	6
5365-00-064-2652	C-8	2	5315-00-992-7283	C-4	2
5220-00-070-7814	C-15	8	5305-00-992-7284	C-4	1
6695-00-070-7815	C-15	9	1005-00-992-7285	C-2	4
4933-00-070-9151	C-15	10	1005-00-992-7287	C-3	1
5120-00-070-9152	C-15	11	1005-00-992-7288	C-3	7
1005-00-087-8998	C-6	8	1005-00-992-7290	C-3	3
	C-6	9	1005-00-992-7291	C-3	6
1005-00-152-3441	C-6	4	5360-00-992-7292	C-3	5
5220-00-155-4925	C-15	5		C-10	21
5220-00-221-9391	C-15	6	5315-00-992-7294	C-2	3
5365-00-252-6853	C-6	10	5340-00-992-7297	C-14	1
5315-00-282-3642	C-8	10	1005-00-992-7299	C-14	4
1005-00-403-0964	C-11	5	5360-00-992-7301	C-10	13
5340-00-463-3892	C-11	3	1005-00-992-7302	C-10	14
5315-00-463-3894	C-11	6	1005-00-992-7307	C-13	3
5360-00-523-8084	C-9	3	5360-00-992-7308	C-13	2
5310-00-527-3634	C-10	19	5315-00-992-7309	C-10	23
5315-00-597-5086	C-3	4	5360-00-992-7311	C-13	1
1005-00-738-6213	C-4	3	5360-00-999-0404	C-5	2
1005-00-760-3768	C-3	8	5340-00-999-0405	C-5	3
4933-00-800-7508	C-15	2	1005-00-999-0406	C-10	16
5315-00-812-3312	C-10	9	1005-00-999-1509	C-2	2
5315-00-814-3530	C-14	5	5220-01-014-8183	C-15	4
1005-00-921-5004	C-1	4	5315-01-027-4759	C-8	6
1005-00-933-8089	C-6	5	4933-01-035-5607	C-15	7
1005-00-937-3078	C-10	2	5220-01-043-9473	C-15	13
1005-00-978-1022	C-8	4	5320-01-063-7635	C-7	5
5315-00-978-1023	C-8	3	5220-01-075-5004	C-15	3
5360-00-978-1025	C-8	5	1005-01-134-3625	C-7	1
1005-00-978-1026	C-8	14	1005-01-134-3629	C-6	3
5360-00-978-1027	C-8	13	1005-01-135-4973	C-10	27
5355-00-978-1029	C-8	9	1005-01-144-1468	C-9	1
1005-00-978-1030	C-8	11	5305-01-144-1494	C-11	7
5360-00-978-1032	C-8	12	1005-01-146-7685	C-11	2
4710-00-978-1038	C-6	2	5365-01-146-7692	C-10	26
5315-00-979-3930	C-7	2	5305-01-147-8585	C-10	28

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
1005-01-148-4805	C-10	20			
1005-01-216-4510	C-1	5			
1005-01-228-8504	C-11	1			
1005-01-248-5858	C-8	1			
5305-01-268-1191	C-10	18			

SECTION IV

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
88044	AN501D416-18	5305-01-268-1191	C-10	18
96906	MS16562-106	5315-00-058-6044	C-6	7
96906	MS16562-119	5315-00-812-3312	C-10	9
96906	MS16562-121	5315-01-027-4759	C-8	6
96906	MS16562-35	5315-00-814-3530	C-14	5
96906	MS16562-96	5315-00-282-3642	C-8	10
96906	MS16562-98	5315-00-597-5086	C-3	4
96906	MS16626-1137	5365-00-252-6853	C-6	10
96906	MS16632-1012	5365-00-064-2652	C-8	2
96906	MS35335-61	5310-00-527-3634	C-10	19
19204	11010032	4933-00-070-9151	C-15	10
19204	11010033	5120-00-070-9152	C-15	11
19204	12006359	4933-01-035-5607	C-15	7
19204	12006472	5220-01-043-9473	C-15	13
19200	12576280	1005-01-248-5858	C-8	1
19200	12620101	5220-01-075-5004	C-15	3
19204	12624561	1005-01-216-4510	C-1	5
19204	7799734	5220-00-070-7814	C-15	8
19204	7799735	6695-00-070-7815	C-15	9
19205	7799792		C-15	12
19205	7799809		C-15	1
19204	8426685		C-15	1
19204	8448201	4933-00-800-7508	C-15	2
19204	8448202	5220-00-221-9391	C-15	6
19204	8448496	5220-01-014-8183	C-15	4
19204	8448501		C-1	1
19204	8448502	5315-00-992-7294	C-2	3
19204	8448503	1005-00-017-9547	C-2	1
19204	8448504	1005-00-999-1509	C-2	2
19204	8448505		C-2	5
19200	8448506	5315-00-992-7283	C-4	2
19200	8448507	1005-00-738-6213	C-4	3
19204	8448508	5305-00-992-7284	C-4	1
19200	8448509	1005-00-992-7285	C-2	4
19204	8448510		C-3	2
19204	8448511	1005-00-992-7287	C-3	1
19204	8448512	1005-00-992-7288	C-3	7
19204	8448513	1005-00-992-7290	C-3	3
19204	8448515	1005-00-992-7291	C-3	6
19204	8448516	5360-00-992-7292	C-3	5
			C-10	21
19204	8448517	1005-00-017-9546	C-1	2
19204	8448518		C-5	4
19200	8448519	5340-00-999-0405	C-5	3
19204	8448520	5360-00-999-0404	C-5	2
13629	8448521-2		C-5	1
19204	8448522		C-1	3
19204	8448523		C-6	1
19204	8448525	1005-00-978-1022	C-8	4
19204	8448532	5360-00-978-1025	C-8	5
19204	8448533	5315-00-978-1023	C-8	3

SECTION IV

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19204	8448534		C-8	15
19200	8448535	5355-00-978-1029	C-8	9
19200	8448536	5360-00-978-1027	C-8	13
19200	8448537	1005-00-978-1030	C-8	11
19200	8448538	5360-00-978-1032	C-8	12
19204	8448539	1005-00-978-1026	C-8	14
19200	8448540	5360-00-017-9541	C-8	7
19200	8448542	5360-00-523-8084	C-9	3
19204	8448543	3040-00-017-9539	C-9	5
19204	8448544	1005-00-017-9540	C-9	4
19200	8448567	4710-00-978-1038	C-6	2
19204	8448571	1005-00-017-9543	C-7	4
19204	8448573	5315-00-979-3930	C-7	2
19204	8448574	5360-00-979-3931	C-7	3
19204	8448576	1005-00-933-8089	C-6	5
19204	8448577	1005-00-992-7280	C-6	6
19204	8448578		C-1	6
19204	8448579		C-10	29
19204	8448580		C-14	6
19200	8448581	5340-00-992-7297	C-14	1
19204	8448582	5315-00-992-6651	C-14	2
19200	8448583	5360-00-992-6652	C-14	3
19204	8448584	5315-00-992-6653	C-10	25
19204	8448585	5315-00-992-6654	C-10	12
19204	8448586	5360-00-992-6655	C-10	11
19204	8448587	1005-00-992-7299	C-14	4
19204	8448591		C-10	17
19204	8448592	1005-00-992-7307	C-13	3
19204	8448593	5360-00-992-7308	C-13	2
19200	8448594	5360-00-992-7311	C-13	1
19200	8448595	1005-00-992-6649	C-10	4
19204	8448599	5315-00-992-6650	C-10	24
19204	8448601		C-1	3
19204	8448602		C-6	1
19204	8448603		C-8	1
19204	8448604		C-1	6
19204	8448605		C-10	29
19204	8448606		C-14	6
19204	8448609	5315-00-992-7309	C-10	23
19204	8448610		C-10	3
19204	8448611	5360-00-992-6648	C-12	1
19200	8448612	1005-00-017-9551	C-12	2
19200	8448615	1005-00-937-3078	C-10	2
19204	8448621	5315-00-017-9537	C-10	15
19200	8448628	1005-00-017-9548	C-10	8
19204	8448629	5360-00-992-6665	C-10	1
19204	8448630	5340-00-992-6666	C-10	5
19204	8448631	1005-00-992-6667	C-10	22
19204	8448633	5360-00-056-2246	C-10	6
19204	8448634	1005-00-056-2247	C-10	7
19200	8448635	1005-00-999-0406	C-10	16

SECTION IV

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19204	8448636	1005-00-992-7302	C-10	14
19204	8448637	5360-00-992-7301	C-10	13
19204	8448638	1005-00-056-2201	C-10	10
19204	8448652	1005-00-403-0964	C-11	5
19200	8448653	5340-00-463-3892	C-11	3
19204	8448655	5315-00-463-3894	C-11	6
19204	8448663	1005-00-152-3441	C-6	4
19200	8448670	1005-00-921-5004	C-1	4
19204	8448677	5220-00-155-4925	C-15	5
19204	8448697	5320-01-063-7635	C-7	5
19204	8448712	1005-00-087-8998	C-6	8
			C-6	9
19200	8448755	1005-00-760-3768	C-3	8
19200	9349056	1005-01-134-3625	C-7	1
19200	9349059	1005-01-134-3629	C-6	3
19200	9349085	1005-01-144-1468	C-9	1
19204	9349086		C-8	8
19200	9349119	1005-01-135-4973	C-10	27
19200	9349120	5305-01-144-1494	C-11	7
19200	9349121		C-11	4
19200	9349127	1005-01-148-4805	C-10	20
19200	9349128	5305-01-147-8585	C-10	28
19200	9349129	5365-01-146-7692	C-10	26
19200	9349130	1005-01-146-7685	C-11	2
19200	9381380	1005-01-228-8504	C-11	1
13629	95113	5315-00-017-9552	C-9	2
13629	95601	1005-00-992-6671	C-10	15

SECTION IV

CROSS-REFERENCE INDEXES
FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
C-1	1		19204	8448501
C-1	2	1005-00-017-9546	19204	8448517
C-1	3		19204	8448522
C-1	3		19204	8448601
C-1	4	1005-00-921-5004	19200	8448670
C-1	5	1005-01-216-4510	19204	12624561
C-1	6		19204	8448578
C-1	6		19204	8448604
C-2	1	1005-00-017-9547	19204	8448503
C-2	2	1005-00-999-1509	19204	8448504
C-2	3	5315-00-992-7294	19204	8448502
C-2	4	1005-00-992-7285	19200	8448509
C-2	5		19204	8448505
C-3	1	1005-00-992-7287	19204	8448511
C-3	2		19204	8448510
C-3	3	1005-00-992-7290	19204	8448513
C-3	4	5315-00-597-5086	96906	MS16562-98
C-3	5	5360-00-992-7292	19204	8448516
C-3	6	1005-00-992-7291	19204	8448515
C-3	7	1005-00-992-7288	19204	8448512
C-3	8	1005-00-760-3768	19200	8448755
C-4	1	5305-00-992-7284	19204	8448508
C-4	2	5315-00-992-7283	19200	8448506
C-4	3	1005-00-738-6213	19200	8448507
C-5	1		13629	8448521-2
C-5	2	5360-00-999-0404	19204	8448520
C-5	3	5340-00-999-0405	19200	8448519
C-5	4		19204	8448518
C-6	1		19204	8448523
C-6	1		19204	8448602
C-6	2	4710-00-978-1038	19200	8448567
C-6	3	1005-01-134-3629	19200	9349059
C-6	4	1005-00-152-3441	19204	8448663
C-6	5	1005-00-933-8089	19204	8448576
C-6	6	1005-00-992-7280	19204	8448577
C-6	7	5315-00-058-6044	96906	MS16562-106
C-6	8	1005-00-087-8998	19204	8448712
C-6	9	1005-00-087-8998	19204	8448712
C-6	10	5365-00-252-6853	96906	MS16626-1137
C-7	1	1005-01-134-3625	19200	9349056
C-7	2	5315-00-979-3930	19204	8448573
C-7	3	5360-00-979-3931	19204	8448574
C-7	4	1005-00-017-9543	19204	8448571
C-7	5	5320-01-063-7635	19204	8448697
C-8	1		19204	8448603
C-8	1	1005-01-248-5858	19200	12576280
C-8	2	5365-00-064-2652	96906	MS16632-1012
C-8	3	5315-00-978-1023	19204	8448533
C-8	4	1005-00-978-1022	19204	8448525
C-8	5	5360-00-978-1025	19204	8448532
C-8	6	5315-01-027-4759	96906	MS16562-121

SECTION IV

CROSS-REFERENCE INDEXES
FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
C-8	7	5360-00-017-9541	19200	8448540
C-8	8		19204	9349086
C-8	9	5355-00-978-1029	19200	8448535
C-8	10	5315-00-282-3642	96906	MS16562-96
C-8	11	1005-00-978-1030	19200	8448537
C-8	12	5360-00-978-1032	19200	8448538
C-8	13	5360-00-978-1027	19200	8448536
C-8	14	1005-00-978-1026	19204	8448539
C-8	15		19204	8448534
C-9	1	1005-01-144-1468	19200	9349085
C-9	2	5315-00-017-9552	13629	95113
C-9	3	5360-00-523-8084	19200	8448542
C-9	4	1005-00-017-9540	19204	8448544
C-9	5	3040-00-017-9539	19204	8448543
C-10	1	5360-00-992-6665	19204	8448629
C-10	2	1005-00-937-3078	19200	8448615
C-10	3		19204	8448610
C-10	4	1005-00-992-6649	19200	8448595
C-10	5	5340-00-992-6666	19204	8448630
C-10	6	5360-00-056-2246	19204	8448633
C-10	7	1005-00-056-2247	19204	8448634
C-10	8	1005-00-017-9548	19200	8448628
C-10	9	5315-00-812-3312	96906	MS16562-119
C-10	10	1005-00-056-2201	19204	8448638
C-10	11	5360-00-992-6655	19204	8448586
C-10	12	5315-00-992-6654	19204	8448585
C-10	13	5360-00-992-7301	19204	8448637
C-10	14	1005-00-992-7302	19204	8448636
C-10	15	1005-00-992-6671	13629	95601
C-10	15	5315-00-017-9537	19204	8448621
C-10	16	1005-00-999-0406	19200	8448635
C-10	17		19204	8448591
C-10	18	5305-01-268-1191	88044	AN501D416-18
C-10	19	5310-00-527-3634	96906	MS35335-61
C-10	20	1005-01-148-4805	19200	9349127
C-10	21	5360-00-992-7292	19204	8448516
C-10	22	1005-00-992-6667	19204	8448631
C-10	23	5315-00-992-7309	19204	8448609
C-10	24	5315-00-992-6650	19204	8448599
C-10	25	5315-00-992-6653	19204	8448584
C-10	26	5365-01-146-7692	19200	9349129
C-10	27	1005-01-135-4973	19200	9349119
C-10	28	5305-01-147-8585	19200	9349128
C-10	29		19204	8448579
C-10	29		19204	8448605
C-11	1	1005-01-228-8504	19200	9381380
C-11	2	1005-01-146-7685	19200	9349130
C-11	3	5340-00-463-3892	19200	8448653
C-11	4		19200	9349121
C-11	5	1005-00-403-0964	19204	8448652
C-11	6	5315-00-463-3894	19204	8448655

SECTION IV

CROSS-REFERENCE INDEXES
FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
C-11	7	5305-01-144-1494	19200	9349120
C-12	1	5360-00-992-6648	19204	8448611
C-12	2	1005-00-017-9551	19200	8448612
C-13	1	5360-00-992-7311	19200	8448594
C-13	2	5360-00-992-7308	19204	8448593
C-13	3	1005-00-992-7307	19204	8448592
C-14	1	5340-00-992-7297	19200	8448581
C-14	2	5315-00-992-6651	19204	8448582
C-14	3	5360-00-992-6652	19200	8448583
C-14	4	1005-00-992-7299	19204	8448587
C-14	5	5315-00-814-3530	96906	MS16562-35
C-14	6		19204	8448580
C-14	6		19204	8448606
C-15	1		19204	8426685
C-15	1		19205	7799809
C-15	2	4933-00-800-7508	19204	8448201
C-15	3	5220-01-075-5004	19200	12620101
C-15	4	5220-01-014-8183	19204	8448496
C-15	5	5220-00-155-4925	19204	8448677
C-15	6	5220-00-221-9391	19204	8448202
C-15	7	4933-01-035-5607	19204	12006359
C-15	8	5220-00-070-7814	19204	7799734
C-15	9	6695-00-070-7815	19204	7799735
C-15	10	4933-00-070-9151	19204	11010032
C-15	11	5120-00-070-9152	19204	11010033
C-15	12		19205	7799792
C-15	13	5220-01-043-9473	19204	12006472

APPENDIX D

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section 1. INTRODUCTION

D-1. SCOPE. This appendix lists expendable/durable supplies and materials you will need to operate and maintain the 5.56mm Rifle M16 and M16A1. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2. EXPLANATION OF COLUMNS.

a. **Column (1)—Item Number.** This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cloth, abrasive, crocus, item 12, app D").

b. **Column (2)–Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. **Column (3)—National Stock Number.** This is the National stock number assigned to the item; use it to request or requisition the item.

d. **Column (4)–Description.** indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. **Column (5)—Unit of Measure (U/M). Indicates the measure used** in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	F	8040-00-944-7292	ADHESIVE KIT: (81 348) MMM-A-1754	KT
2	C	1005-00-242-5687	BOTTLE ASSEMBLY, CYLINDRICAL (19204) 8448444	EA
3	O	8020-00-244-0153	BRUSH, ARTIST'S: metal furrule, flat chisel edge 7/1 6 w, 1 1/8, exposed bristle (81 348) H-B-241	EA
4	C	1005-00-903-1296	BRUSH, CLEANING, SMALL ARMS; bore (1 9204) 11686340	EA
5	C	1005-00-999-1435	BRUSH, CLEANING, SMALL ARMS: chamber (1 9204) 8432358	EA
6	C	1005-00-494-6602	BRUSH, CLEANING, SMALL ARMS: tooth (1 9204) 8448462	EA

(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	U/M
7	O	7920-00-205-2401	BRUSH, CLEANING, TOOLS AND PARTS: (96906) MS 16746-29	EA
8	F	6850-00-965-2332	CARBON REMOVING COMPOUND (81348) P-C-111	GL
9			CLEANER, LUBRICANT AND PRESERV- ATIVE: (27412)	
	C	9150-01-102-1473	CLP 1/2 OZ BOTTLE	EA
	O	9150-01-079-6124	CLP-4 4 OZ BOTTLE	EA
	O	9150-01-054-6453	CLP-5 PT BOTTLE	EA
	O	9150-01-053-6688	CLP-7 GAL BOTTLE	EA
10	C	9920-00-292-9946	CLEANER, TOBACCO PIPE: (92849) DILLS (32 PER PK)	EA
11			CLEANING COMPOUND,RIFLE BORE: SMALL ARMS BORE CLEANING SOLUTION (RBC) (81349) MIL-C-372	
	C	6850-00-224-6656	2-OZ (59.15-ML) BOTTLE	OZ
	O	6850-00-224-6657	8-OZ (236.59-ML) CAN	OZ
	O	6850-00-224-6663	1-GAL (3.79-L) CAN	GL
12	O	5350-00-221-0872	CLOTH, ABRASIVE (58536) A-A-1206	SH
13	O	8010-00-181-7859	COATING COMPOUND,FLUORESCENT: PAINT FOR BLANK FIRING ATTACHMENT (81349) MIL-P-21563 1 PT CAN	EA
14	F		DICHLOROMETHANE, TECHNICAL: (81349) MIL-D-6998	
		6810-00-244-0290	5 GAL PAIL	CN
		6810-00-616-9188	600 LB DRUM	DR
15	O	6850-00-281-1985	DRY CLEANING SOLVENT (58536) A-A-711 1 GAL CAN	GL
16	O	8415-00-823-7457 SIZE 11 8415-00-823-7456 SIZE 10 8415-00-823-7455 SIZE 9	GLOVES, CHEMICAL AND OIL PROTECTIVE (81348) ZZ-G-381	PR

(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	U/M
17	F	9150-00-754-2595	GREASE, MOLYBDENUM DISULFIDE (81349) MIL-G-21164	LB
18	C	1005-01-113-0321	HANDLE SECTION, CLEANING ROD, SMALL ARMS: (19204) 8436776	EA
19	O	9150-01-260-2534	LUBRICANT, SOLID FILM: (81349) MIL-L23398 16 OZ SPRAY CAN	OZ
20	C	9150-00-292-9689	LUBRICATING OIL, WEAPONS: (LAW) (81349) MIL-L-14107 1 QT (0.95-L) CAN	QT
21			LUBRICATING OIL, WEAPONS: (LSA), SEMIFLUID (81349) MIL-L-46000	
	C	9150-00-935-6597	2-OZ (59.15-ML) PLASTIC BTL	OZ
	C	9150-00-889-3522	4-OZ (118.30-ML) PLASTIC BTL	OZ
	O	9150-00-687-4241	1-QT (O.95-L) CAN	QT
	O	9150-00-753-4686	1-GAL (3.79-L) CAN	GL
22	O	4940-00-795-3595	PAN, WASH: (94453) 1211	EA
23	F	6850-00-826-0981	PENETRANT KIT: KT (81349) MIL-L-25135	KT
24	C	7920-00-205-1711	RAG, WIPING: (81348) DDD-R-30 50 LB BDL	LB
25	C	1005-00-050-6357	ROD SECTION, CLEANING, SMALL ARMS: (19204) 8436775 (3 REQUIRED)	EA
26	F	8030-00-670-8553	SEALING COMPOUND: (93648) DEVCONF	KT
27	C	1005-00-937-2250	SWAB HOLDER SECTION, CLEANING ROD, SMALL ARMS: (19204) 11686327	EA
28	C	1005-00-912-4248	SWAB, SMALL ARMS: (19204) 11686408	EA
29	F	8115-00-190-5002	BOX,SHIPPING, FIBERBOARD (81348) PPP-B-636	EA
30	F	8115-00-023-0301	BOX, SHIPPING, FLAPS (81348) PPP-B-601	EA

(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	U/M
31	F	8135-00-855-6969	CUSHIONING MATERIAL (81348) PPP-C-843	EA
32	F	7510-00-297-6655	TAPE, PRESSURE SENSITIVE (81348) PPP-T-76	YD
33	F	8135-00-810-4075	BARRIER MATERIAL. GREASE-PROOFED, WATERPROOFED FLEXIBLE (81349) MIL-B-121	YD
34	F	8105-00-264-5523	ENVELOPE PACKAGING (81349) MIL-B-117	EA
35	F	8135-00-938-1565	FIBERBOARD, CORRUGATED (81348) PPP-F-320	EA
36	F	8115-00-616-9151	BOX, SHIPPING (81348) PPP-B-640	EA
37	F	8115-00-685-5171	BOX, SHIPPING (81348) PPP-B-621	EA
38	F	8135-01-019-1691	SHEET, POLYETHYLENE (84744) PE88-80-2	EA

APPENDIX E

ILLUSTRATED LIST OF MANUFACTURED ITEMS

INTRODUCTION.

a. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit or direct support level.

b. A part number in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

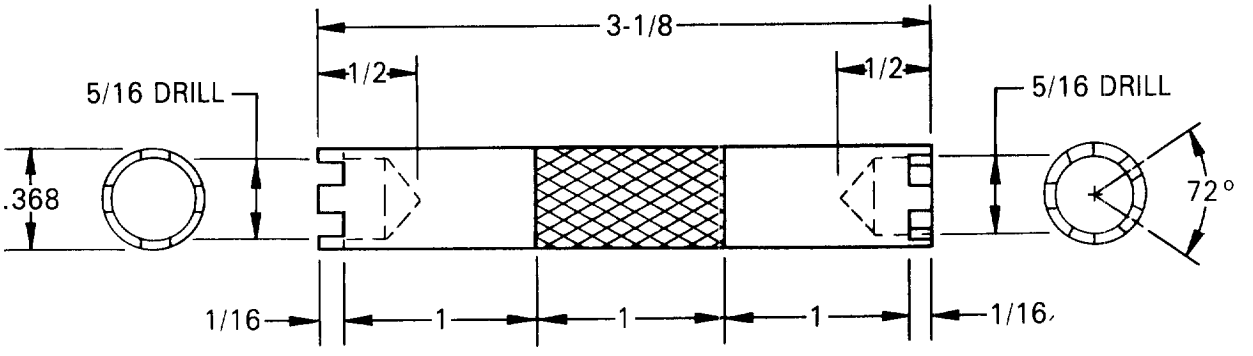
c. All bulk materials needed for manufacture of an item are listed in a tabular list on the illustration.

d. Figures E-1 and E-3 may be fabricated by Direct Support Maintenance.

e. Figure E-2 may be fabricated by Unit Maintenance.

INDEX

Item	Figure Number
Front sight post and low light level front sight post removing and installation tool	E-1
Pivot pin removing tool	E-2
Key tool	E-3
Front sight detent depressor	E-4
Pivot pin installation tool	E-5



MATERIAL BLOCK
FSCM 81346 ASTM A686 METAL BAR
STEEL, GRADE C, GLASS W2-09
HOT ROLLED, ROUND, 0.375 INCH NOMINAL
DIAMETER, 3 FOOT NOMINAL LONG
NSN 9510-00-640-4407 OR EQUIVALENT

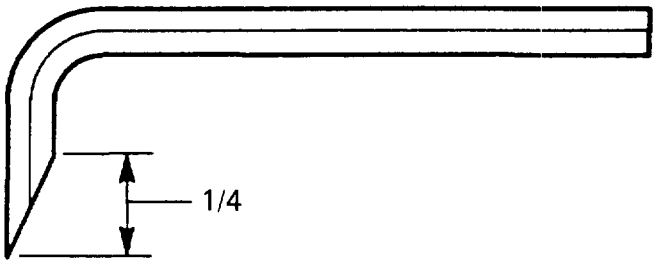
NOTE

Teeth must be hand filed to fit front sight post.

MATERIAL: MILD STEEL

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES AND KNURLING IS OPTIONAL IF DESIRED.

Figure E-1. Front sight post and low light level front sight post removing and installation tool.

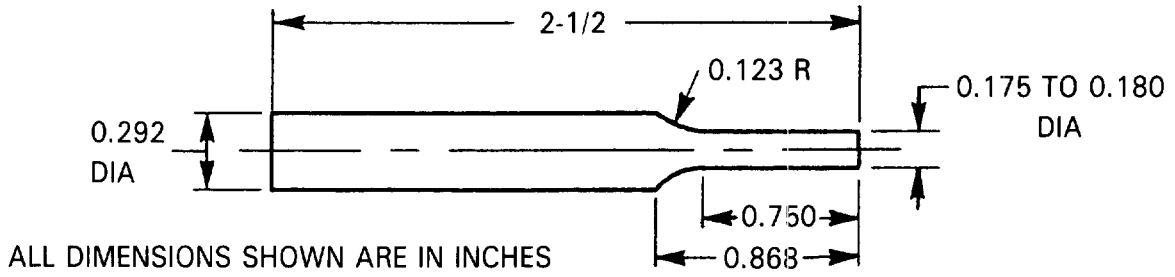


NOTE: 1. FABRICATE FROM 1/16 IN, SOCKET HEAD SCREW KEY NSN 5120-00-198-5398 OR EQUIVALENT

2. ALL DIMENSIONS ARE IN INCHES.

AR 922734

Figure E-2. Pivot pin removing tool.

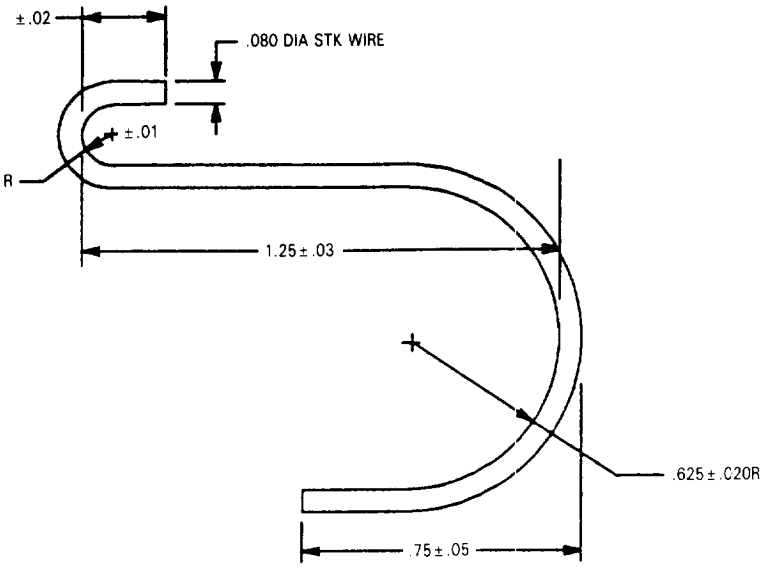


NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES

MATERIAL BLOCK
FSCM 81346 ASTM A686 METAL BAR
STEEL, GRADE C, CLASS W209
HOT ROLLED, ROUND 0.375 INCH NOMINAL
DIAMETER, 3 FOOT NOMINAL LONG
NSN 9510-00-640-4407 OR EQUIVALENT

AR 922842

Figure E-3. Key tool.

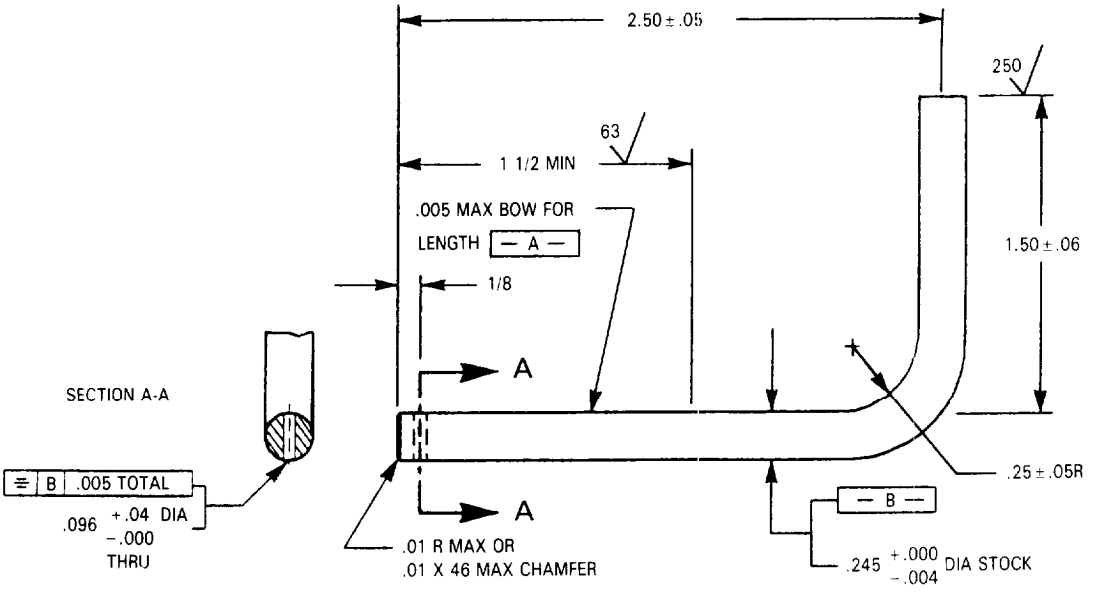


FABRICATE FROM .08 IN. MUSIC WIRE OR EQUIVALENT.

FINISH: NO. 5. 3.1.2 OR 5.3.2.2 OF MIL-STD-17

NOTE: ALL DIMENSIONS ARE IN INCHES.

Figure E-4. Front sight detent depressor.



FABRICATE FROM .249 IN. STEEL A1S1 1095 OR EQUIVALENT.

**HARDEN AND TEMPER TO RC-57-61 FOR LENGTH A-
FINISH 5.3.1.2 OR 5.3.2.2 OR MIL.-STD-171.**

NOTE: ALL DIMENSIONS ARE IN INCHES.

Figure E-5. Pivot pin installation tool.

APPENDIX F

TORQUE LIMITS

INTRODUCTION.

a. This appendix includes a standard torque table of the most commonly torque screws, bolts, and nuts.

b. These torque values may be used when torque values are not specified.

c. The torque table values are given in inch-pounds. If a torque wrench is calibrated in foot-pounds, you need to divide the listed number by 12 to obtain the desired torque.

STANDARD TORQUE TABLE (INCH-POUNDS)

Torque Values In Inch-Pounds for Tightening Nuts				
Bolt, Stud, or Screw Size	On standard bolt, studs, and screws having a tensile strength of 125,000 to 140,000 psi.		On bolts, studs, and screws having a tensile strength of 140,000 to 160,000 psi.	On high-strength bolts, studs, and screws having a tensile strength of 160,000 psi and over.
	Sheer type nuts (AM320, AN364, or equivalent)	Tension type nuts and threaded machine parts (AN310, AN365, or equivalent)	Any nut, except shear type	Any nut, except shear type
8-32	7-9	12-15	14-17	15-18
8-36	7-9	12-15	14-17	15-18
10-24	12-15	20-25	23-30	25-35
1 /4-20	25-30	40-50	45-49	50-68
1/4-28	30-40	50-70	60-80	70-90
5/16-18	48-55	90-90	85-117	90-114
5/16-24	60-85	100-140	120-172	140-203
3/8-16	95-110	160-186	173-217	185-248
3/8-24	95-110	160-190	175-271	190-351
7/16-14	140-155	235-255	245-342	255-428
7/16-20	270-300	450-500	475-628	500-756
1/2-13	240-290	400-480	440-636	480-792
1/2-20	290-410	480-690	585-840	690-990
9/16-12	300-420	500-700	600-845	700-990
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NATIONAL GROUND INTELLIGENCE CENTER

Operator's Manual

PK-Series General-Purpose Machinegun

May 2005

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DEPARTMENT OF THE ARMY
NATIONAL GROUND INTELLIGENCE CENTER
2055 BOULDERS ROAD
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Operator's Manual

7.62 x 54R-mm, PK, General-Purpose Machinegun

Developed by:

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Email: frcresp@ngic.army.mil

Close Combat Division, Ground Systems Directorate

This is not an official US Army or Marine Corps publication. Information contained within was developed solely through evaluation, analysis, and information gathered from translated manuals. This manual is designed to provide instructor guidance for presenting instruction, as required on the PK-Series Machinegun. This publication was prepared by the Close Combat Division, Ground Systems Directorate, National Ground Intelligence Center, Charlottesville VA 22911. Other than normal exchange with other agencies at the working level, this document has not been coordinated outside NGIC. Interpretation of information in this publication represents the views of NGIC and may be subject to modification as a result of subsequent information.

PREFACE

PURPOSE

This publication provides an introduction to the 7.62 x 54R mm, PK, General Purpose Machinegun.

SCOPE

This manual contains instructions for the operation and maintenance of the PK machinegun.

APPLICABILITY

This publication applies to all military personnel who require operator and maintenance information pertaining to the PK machinegun.

ADMINISTRATION

Recommendations for weapons publication improvements.

Reports of errors, omissions, and recommendations for improving this publication by the user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded to: Commander, National Ground Intelligence Center, Attn: IANG-GS-CC (MS 304), 2055 Boulders Road, Charlottesville, VA 22911.

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Section I. General

The Soviet/Russian 7.62 x 54R-mm, PK family of General-Purpose Machineguns is composed of open-bolt-fired, gas-operated, rotary-locked-bolt (Kalashnikov), belt-fed, fully automatic weapons. The ammunition is fed by non-disintegrating metallic belts; current belts are composed of joined 25-round sections, but earlier feed belts were made of one 250-round length. Belt boxes for 100- and 250-round belts are available. Both boxes can be attached to the underside of the PK receiver. The receiver is constructed of riveted stampings. It carries the very simple trigger, which is automatic only, and the belt-feed mechanism.

The term “general purpose” refers to a machinegun that, with minor changes, can be used in a variety of tactical roles. The basic PK or PKM on its bipod fills the light machinegun role. The PKS or PKMS is a PK or PKM mounted on a light tripod fulfils the heavy machinegun role. The PKT is a PK modified for use as an armored vehicle coaxial machinegun. The PKB is a PKT fitted with sights and spade grips for use as a pintle-mount machinegun on combat vehicles.

Accessories include spare parts, a combination tool and an oil-solvent container. The largest accessory is the general-purpose tripod, which can be quickly adapted for anti-aircraft fire. The version issued with the PK machinegun is the Samozhenkov tripod which weighs 7.7 kg. When the PKM was introduced in 1969, it was issued with a newer and lighter tripod, known as the Stepanov tripod. The Stepanov tripod is made almost entirely from steel stampings and weighs only 4.5 kg. Each tripod leg can be folded for transport or adjusted for proper height on uneven terrain. It is possible to secure a magazine box to it in such a manner that the gun can be moved with the ammunition box still in place and with the gun loaded. Sandbags are required to secure the Samozhenkov and Stepanov tripods during firing due to their low weight.

Similar to the AK series of assault rifles, the PK series of machineguns is also widely exported and widely produced by many countries. Most are virtually exact copies; however, some have indigenous modifications. Listed below are many of the producers of PK’s.

- Bulgaria (Arsenal): MG (PK), MG-M1 (PKM) and MG-M1S (PKMS), and MG-T (PKT).
- China (Norinco): Type 80 (PK) and Type 59 (PKT).
- Kazakhstan (Kaspex): PKD (converted PKT). Converted mainly by adding a tubular butt-stock assembly and a bipod. The main PKT features, such as the heavier barrel, were retained. The butt-stock has a shock-absorbing butt-plate.
- North Korea: Type 68 (PK) and Type 73 (PKM). The Type 68 is a PK with the long PKT barrel (w/front sight) an oddly shaped buttstock, and a ladder-type rear sight.
- Poland: PKMP (PKM), PKMSP (PKMS), PKMSNP (PKMS w/GARBO ×4 magnification night sight capable of engaging targets at up to 400 m at night), PKMNP (PKM w/GARBO ×4 magnification night sight capable of engaging

targets at up to 400 meters at night), PKT (PKT), and the GROM or “Thunder” (pintle-mounted PKT with a manual trigger intended for naval and static applications). All the models produced have their iron sights illuminated by tritium light sources.

- Romania (RomArm): PKT (PKM) and PKMS (PKMS). There is also a PKA (unknown which version–likely PKT) for aircraft installations.
- Yugoslavia (Zastava): M84 (PKM) and M86 (PKT). The M86 may be found in three different versions. 1) The coaxial gun for the M84 battle tank,which has a fixed heavy barrel and a remote-control solenoid firing mechanism. 2) The externally mounted commander’s gun, the M86A, also has a solenoid firing mechanism and a rapid-change barrel. 3) If required, the M86A can be used dismounted. When dismounted, the firing solenoid is replaced by a manual trigger group and pistol grip, combined with a rudimentary butt.

Development work has been conducted by several countries to produce corresponding versions of the PK machineguns capable of firing 7.62x51-mm NATO ammunition has been completed. This was done primarily to exploit the export market and to meet NATO compatibility of new NATO members. Known caliber conversions are:

- Bulgaria (Arsenal): MG-M1 (PKM) and MG-M1S (PKMS).
- Poland: UKM-2000 series, UKM-2000P (PKM), UKM-2000D (PKMS), and UKM-2000C (PKT).

PK Series Machineguns

PK: The basic gun (see figure 1-1) with a heavy fluted barrel, feed cover constructed from both machined and stamped components and a plain butt plate. The PK machinegun weighs about 9 kg (19.8 lbs).

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Figure 1-1. Russian PK Machinegun

PKS: The basic PK mounted on a tripod. The lightweight tripod, 4.75 kg (10.45 lbs), not only provides a stable mount for long-range ground fire, it also can be quickly opened up to super elevate the gun for anti-aircraft fire.

PKT: The PKT (see figures 1-2 & 1-3) is a PK altered for coaxial installation in an armored vehicle. The sights, stock, tripod, and trigger mechanism have been removed; a longer, heavier barrel is installed, and an electrical solenoid is fitted to the receiver back plate for remote triggering. The PKT has an altered method of connecting the barrel to the receiver. An emergency manual trigger and safety is fitted for firing the weapon dismounted from its vehicle.

Figure 1-2. Russian PKT Tank Machinegun

Figure 1-3. Russian PKTM Tank Machinegun

PKM: A product-improved PK (see figure 1-4), with a lighter weight, un-fluted barrel, the feed cover constructed wholly from stampings with a hinged butt rest fitted into the butt plate. Excess metal has been machined away wherever possible to reduce weight.

Figure 1-4. Russian PKM (Top) and
North Korean Type 73 (Bottom) Machinegun

Figure 1-5. Yugoslav M-84 Machinegun

PKMS: The PKMS (see figures 1-6 – 1-10) is a PKM mounted on a new pattern of tripod designed by L V Stepanov, on which the ammunition box can be secured to the right rear tripod leg. This enables one crew member to carry and operate the gun in combat without having to unload the gun for moves. The tripod can also be configured for air-defense fire. The PKMSN is similar to the PKMS but with the addition of a night sight, typically an NSPU or an NSPUM.

Figure 1-6. Russian PKMS Machinegun
Mounted on a Stepanov Tripod

Figure 1-7. Russian PKMS Machinegun
Mounted on a Tripod

Figure 1-8. Russian PKMS Machinegun
Mounted on Stepanov Tripod in AA Mode

Figure 1-9. Chinese Type 80 (PKMS) Machinegun

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Figure 1-10. Bulgarian MG-M1S (PKMS) Machinegun

PKB or PKMB:
The PKB (see figure 1-11) is the PKM with the tripod, butt-stock, and trigger mechanism removed and replaced by twin spade grips and a butterfly trigger similar to those on the SGMB. This gun may also be known as the PKMB. Late-production models of this weapon may be fitted with night-sight units with a night-firing range of 300 meters. The weight of the sight unit is 2.95 kg.

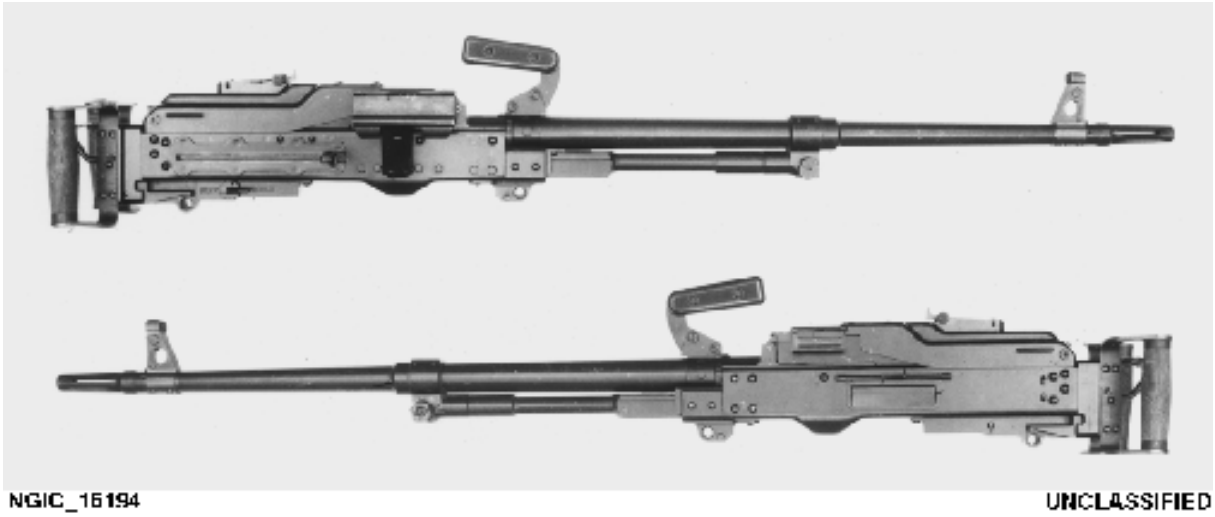

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Figure 1-11. Russian PKB Machinegun

Unified Machinegun (UMG): The UMG was introduced in 1993 as an upgrade to the PKM machinegun. It is chambered for a new 6x49-mm rimmed cartridge vice the standard 7.62x54R cartridge used for the PK and PKM. The UMG has a longer barrel than a either a PK or a PKM, but is roughly the same length (1150 mm). It reportedly weighs only 6.5-kg. Prototypes were shown with no iron sights, but instead fitted with an optical sighting device. It is also reported that it has high chamber pressures and thus may suffer from case separation.

6P41 Pecheneg: The Pecheneg (see figure 1-12) is based on the PKM machinegun, sharing about 80% of common parts. It retains many features of the PKM except that it now features a new heavy fixed barrel that is claimed to enhance accuracy out to a range of 1500- meters. The new barrel is heavy, ribbed, and enclosed in a metallic sleeve. During fire, hot powder gases emerging from the barrel cause air in the sleeve to circulate along the barrel cooling it so that it reportedly can sustain rates of fire of about 1000 rounds per hour without decrease of performance or barrel life. Overall barrel life is claimed by the Russians to be over 30,000 rounds. The sights are calibrated up to 1500 meters. It is claimed that at this range, shot dispersion is stated to be a maximum of 300 mm in width and 342 to 820 mm in height. Unlike other PK series models, the bipod is secured just under the muzzle. A fixed carrying handle is provided over the barrel. Standard tripods can be used.

Figure 1-12. Russian 6P41 Pecheneg Machinegun

Description of the PK Machinegun Components

The PK machinegun has the following major components (see figure 1-13): the barrel assembly, receiver assembly and grip, cover and feed mechanism assembly, sight assemblies, gas block assembly with gas regulator, gas cylinder assembly, operating rod assembly, slide assembly, piston assembly, bolt assembly, trigger assembly, gun stock assembly, and bipod assembly.

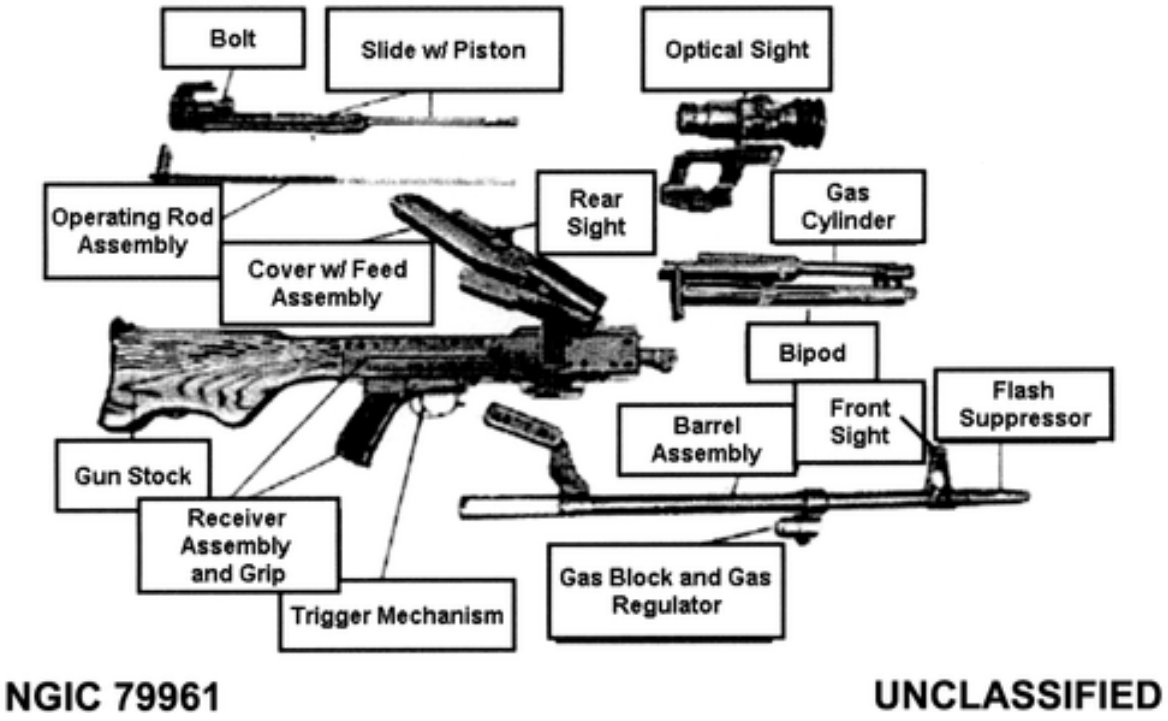

Figure 1-13. PK Main Components

Barrel Assembly. Firing takes place in the barrel assembly (see figure 1-14), which gives the bullet its direction and spin during flight. The barrel houses the chamber and bore. The bore is rifled and has four grooves and four lands which twist to the right. The bore and chamber are chrome plated.

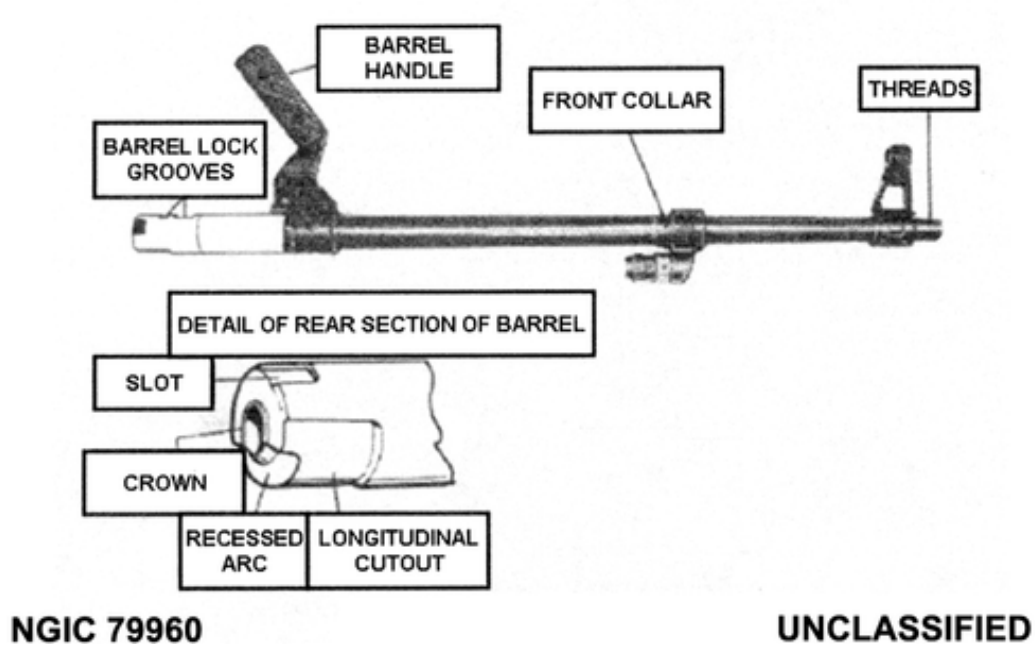

Figure 1-14. Barrel Assembly

On the front end of the barrel assembly there are threads for screwing on the flash suppressor or a recoil device for blank ammunition. Behind the threads there are three grooves (two on the bottom that hold pins for attaching the front sight mount and one on the bottom that simultaneously fastens the front sight mount and the flash suppressor latch). The gas block is attached to the front collar. On the top of the front collar there are two grooves that hold the pins. The front collar is notched, which limits the backward movement of the gas block ring when it is fitted onto the barrel.

At the rear of the barrel assembly there is a wide circular groove which holds the barrel handle. The longitudinal movement of the barrel handle is limited by two rings. The rear ring has a slot that limits lateral movement of the handle. Two smaller slots hold lugs on the front of the barrel socket which prevent the barrel from twisting. Behind the rings, on the chromed section of the barrel, there are two grooves on the top into which the lugs of the barrel lock fit and which lock the barrel into the barrel socket. On the rear surface of the barrel there is a recessed arc into which the extractor claw fits, which allows it to catch on the rim of the cartridge case. On the bottom a longitudinal cutout receives the lug of the slide, and on the right side there is a smaller slot into which the receiver lug fits. The rim of the cartridge case fits onto the crown of the barrel.

Flash Suppressor. The flash suppressor serves to disperse the propellant gases at the muzzle, as well as to reduce flash and thus to conceal the position of the ordnance. There are five elongated vents for the release of the propellant gases. On the outside of the rear section it has five oval cutouts into which its latch fits, and on the inside there are threads for affixing it to the barrel. The flash suppressor is screwed onto the barrel by twisting it from left to right; it is removed by twisting it in the opposite direction.

Barrel Handle. The barrel handle facilitates the quick and easy removal of the barrel assembly from the receiver, as well as the transport of the ordnance. It is fastened onto the barrel by means of rings. The rings are each fastened to the barrel by three machine bolts, of which the two upper machine bolts serve to fasten the handle. On the bottom of the handle there is an oval opening into which the middle machine bolt fits, allowing the handle to move vertically. On the rear of the bottom of the handle is a tooth which rests against the front section of the barrel socket (when the handle is raised upward) and when the barrel is to be removed ensures the initial movement of the barrel forward. The panels of the handle are plastic and are joined together and to the handle with two machine bolts.

Receiver Assembly. The receiver assembly and grip (see figures 1-15 & 1-16) serves to join all parts of the machinegun to ensure their proper functioning and to guide the movement of the slide and bolt. The receiver is sealed on the top by the cover.

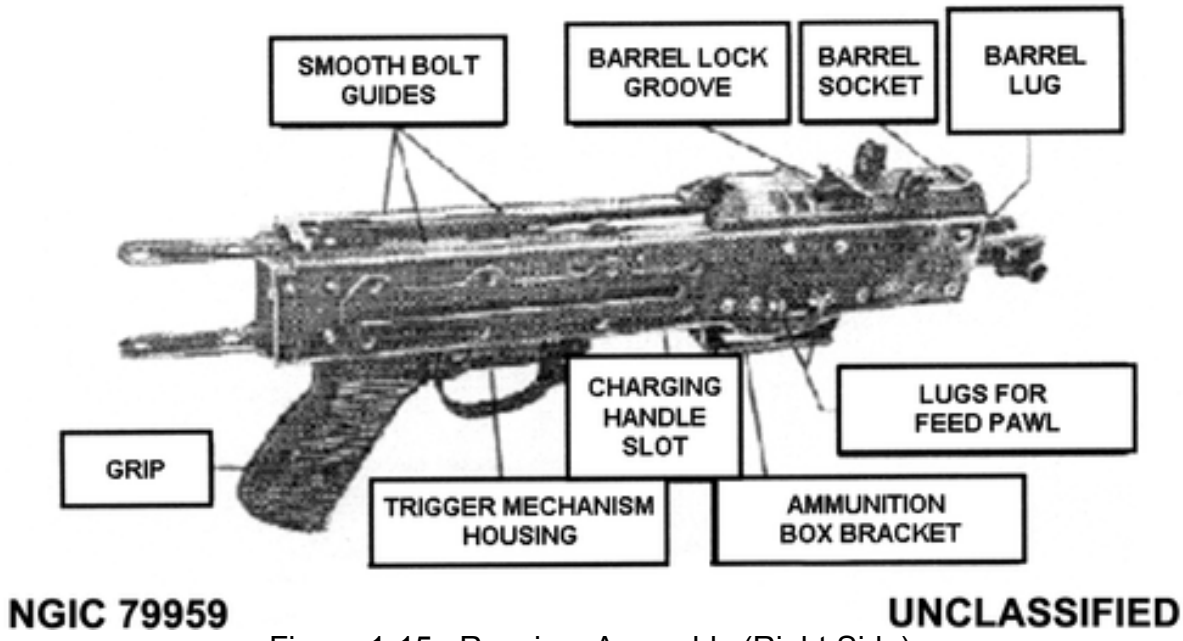

Figure 1-15. Receiver Assembly (Right Side)

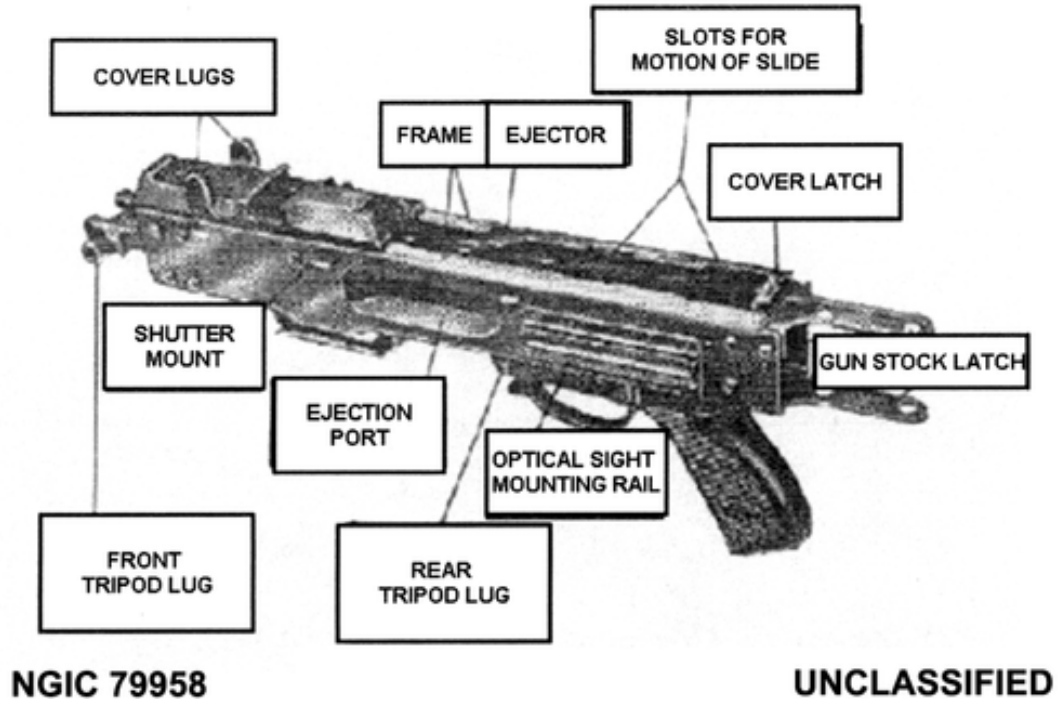

Figure 1-16. Receiver Assembly (Left Side)

The receiver assembly consists of three components: the receiver frame, the barrel socket, and the gun stock bracket; all have interlocking grooves and are riveted together. The receiver frame has a box shape. The tops of the sides are curved inward and serve to guide the slide.

On the left side of the receiver is the ejection port which can be closed with a shutter. The shutter is fastened to the receiver with a pin and a spring which continually presses it downward. The optical (passive night) sight mounting rail is welded to the receiver frame behind the ejection port. To the rear of the optical sight mounting rail are two circular openings which hold the wire latch of the shutter pin. The shutter arm is located inside the left side of the receiver frame and its front curved end protrudes through the ejection port. The arm serves to open the shutter as the slide moves to the rear position.

A rectangular slot on the front right side of the receiver frame holds lugs of the barrel socket, into which the feed pawl is attached along with its guard. To the rear of the feed pawl the receiver frame is grooved inwards longitudinally with a profiled opening on the front end. The cocking lever fits into the cutout, and its tooth moves through the profiled opening. On the outside the cocking lever is fastened with a plate that has a longitudinal groove for the movement of the cocking lever. The plate is welded to the receiver frame.

The top of the receiver frame has a long slot—the rear section of which has wider cutouts which allow the slide to be removed from the receiver frame. The ejector is riveted to the upper part of the receiver frame.

Along the bottom, the receiver frame extends downward, and the lower leg of the feed pawl fits into this well. The round opening in the well serves to allow any water that might collect in the receiver to drain. The bracket for an ammunition box containing 100 rounds is attached over the well. To the rear of the bracket for the ammunition box there is a rectangular opening for the trigger mechanism.

The rear of the receiver frame is sealed by the gun stock bracket. The gun stock bracket consists of an upper and lower tab, each of which has holes for machine bolts that fasten the gun stock.

The front of the bracket has two round openings: the upper, larger opening allows the passage of the guide of the operating rod assembly, and the lower, smaller opening allows bore sighting (when the gun stock has been removed) when the precision and accuracy of the machinegun is being tested. The top of the gun stock bracket is curved back at the front for latching the receiver cover closed.

Barrel Socket. The barrel socket has a round opening on the top. Behind the opening there are two lugs for attaching the receiver cover and the feed plate. Behind the lugs there is a lateral groove for the barrel lock.

On the front of the barrel lock there are the following: two lugs that prevent the barrel from twisting in the socket; a longitudinal cylindrical opening which holds the barrel; an oval groove which houses the rear finger of the barrel; a vertical slot for the gas cylinder latch; two studs for mounting on the frame of the tripod cradle; two profiled lugs and two arced grooves for fitting the machinegun support on the tripod for engaging targets in the air; on the bottom, a rectangular longitudinal slot and two longitudinal grooves for attaching the gas cylinder.

Inside the barrel socket there are the following: lugs for holding the bolt in locked position and a lug with a beveled surface which allows the initial rotation of the bolt when it is locked.

On its upper rear section the barrel socket has a longitudinal cutout for the ribs of the feed plate.

Charging Handle. The charging handle serves to move the bolt into its rear position. It consists of the slide, handle, helical compression spring, and shaft (see figure 1-17).

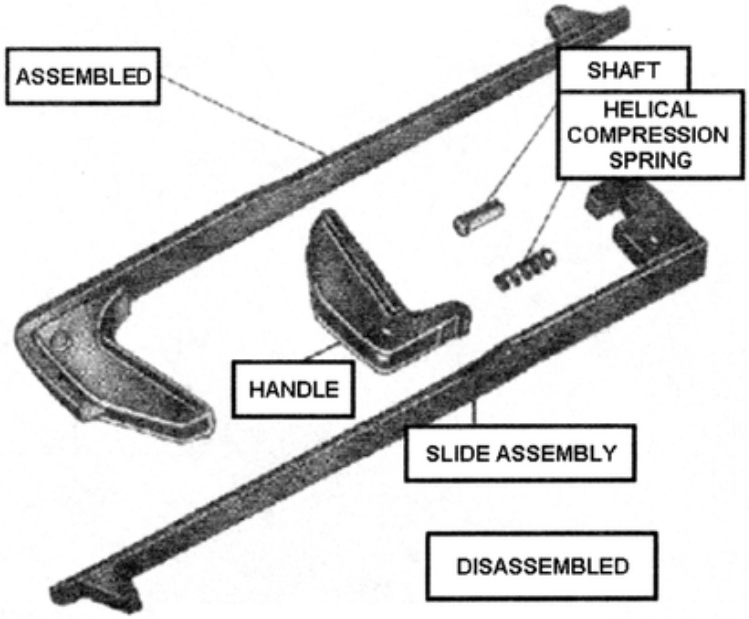

Figure 1-17. Charging Handle Assembly

Grip. The grip serves to facilitate the handling of the machine when firing. It is fastened to a lug on the frame of the trigger mechanism with a machine bolt.

Barrel Lock Assembly. The barrel lock assembly serves to fasten the barrel into the barrel socket and to adjust the headspace between the bolt and the rear section of the barrel. It consists of the following: the body, a machine bolt, a plug, and a pin (see figure 1-18). On the bottom of the body are two lugs and a groove for fastening the barrel. On the top there is a stepped cutout along which the feed pawl claw passes. The body has a longitudinal threaded opening for the machine bolt. The plug limits the movement of the lock into the extreme leftward position. Behind the lock, on the right side, there is a transverse, beveled recess into which the feed pawl fits.

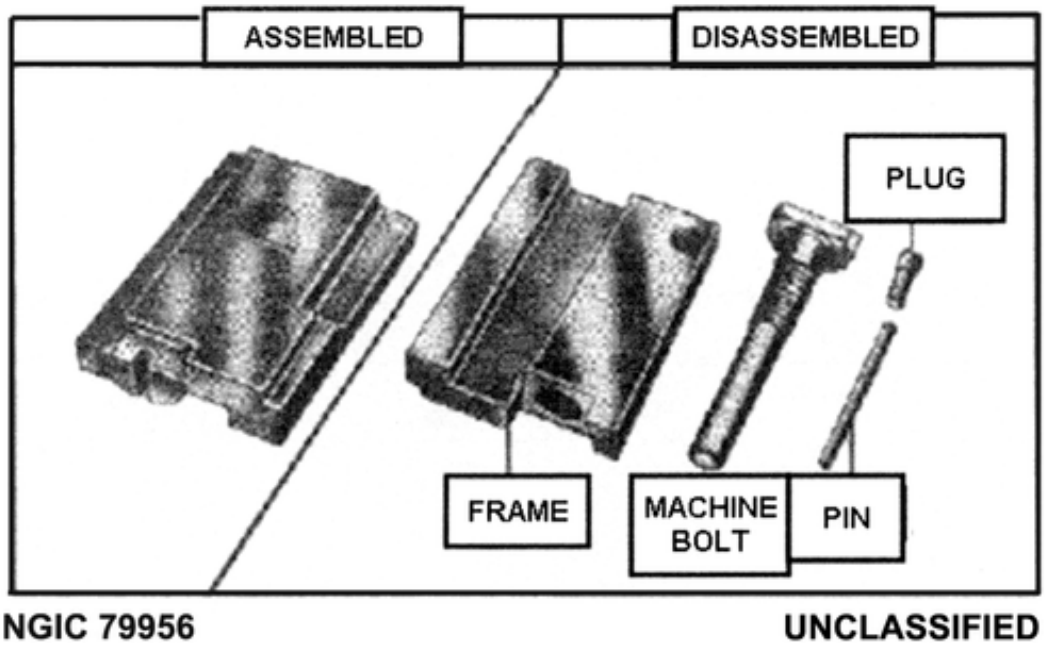

Figure 1-18. Barrel Lock Assembly

Receiver Cover and Feed Assembly. The receiver cover and feed assembly (see figure 1-19) serve to close the top of the receiver and to ensure the fitting and function of the components of the feed.

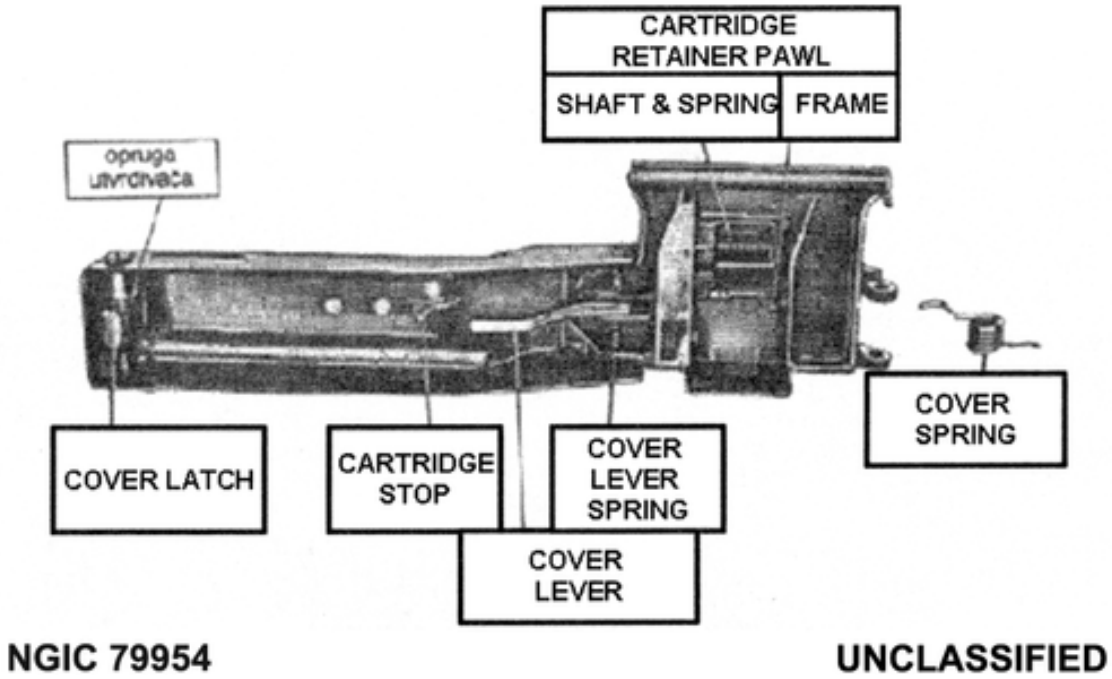

Figure 1-19. Receiver Cover Assembly

The front of the cover assembly has two lugs which hold the retaining pin, which fastens the cover onto the barrel socket. A helical torsion spring is slipped onto the retaining pin and holds the cover in an upright position when it is opened. The recessed surfaces of the lug bases limit the degree to which the cover can be lifted. A longitudinal opening houses the shaft of the cartridge retainer assembly.

The rear sight base and the rear sight bar guard are riveted to the top of the cover assembly.

The front section of the cover has two lugs which hold the pins and the springs of the shutters (the entry shutter is on the right, and the exit shutter is on the left). The shutter springs hold the cover in the closed position.

At the rear of the cover assembly is a square opening into which the cover latch fits. The body of the latch is notched so that it may be easily pressed forward, and on the bottom it extends out into a tooth. The latch assembly is fastened by a shaft. The latch spring presses the assembly tooth forward.

In the center of the inside of the cover is a longitudinal rectangular slot into which the cartridge stop fits. In front of the cartridge stop the cover is cut out in a profile with two lugs. The cover lever fits into the recess between the lugs and is fastened with its pin. The helical torsion spring presses the cover lever downward. In the front area of the interior there are guide lugs. The cartridge retainer pawl and its helical torsion spring fit into the groove between the lugs.

Feed Assembly. The feed assembly serves to ensure that the cartridge is fed onto the axis of motion of the bolt. It consists of the following components: the feed plate, the feed pawl and guard, and the cartridge retainer pawl.

Feed Tray. The feed tray (see figure 1-20) serves to direct the motion of the link belt and to direct the cartridge as it is fed into the chamber. On the front area of the feed tray there are two lugs for the cover retaining pin, which fastens it to the barrel socket. On the front left side there is a round hole which holds the feed tray latch. The latch consists of the body and a spring and serves to hold the feed tray in the open position.

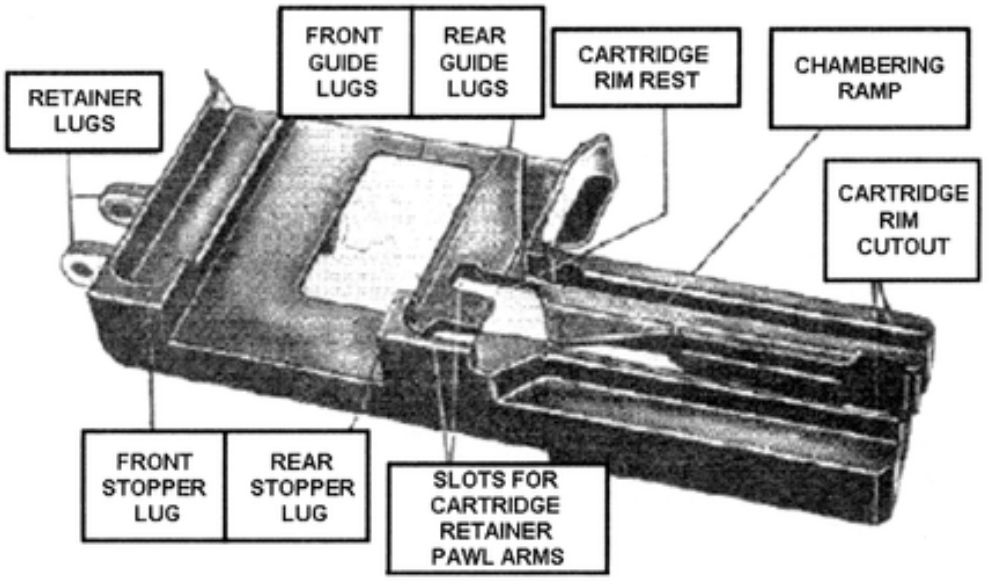

Figure 1-20. Feed Tray Assembly

On the top of the feed tray there are two sets of lugs (the guide lugs and the stopper lugs), which feed the next cartridge towards the extractor claws on the barrel socket. Between the lugs there is a lateral opening, allowing the movement of the feed pawl arm. In the rear guide lug there are profiled recesses (into which the legs of the cartridge retainer pawl fit) and the cartridge rim rest.

On the top of the rear of the feed tray there are ribs between which there runs a longitudinal groove which allows the extractor to move. The groove has a longitudinal slot, and in the front, on the sides, there is a chambering ramp which cams the cartridge into the chamber. In the rear, the groove has vertical recesses allowing the rim cartridge case to pass.

On the bottom, the feed tray has external ribs which fit into the grooves on the barrel socket, and there are two internal ribs under which the slide moves.

Feed Pawl. The feed pawl (see figure 1-21) serves to feed the link belt with the cartridges onto the feed tray. It consists of the frame, roller and pin, arm and spring, the guard, the pivot pin, and helical torsion spring.

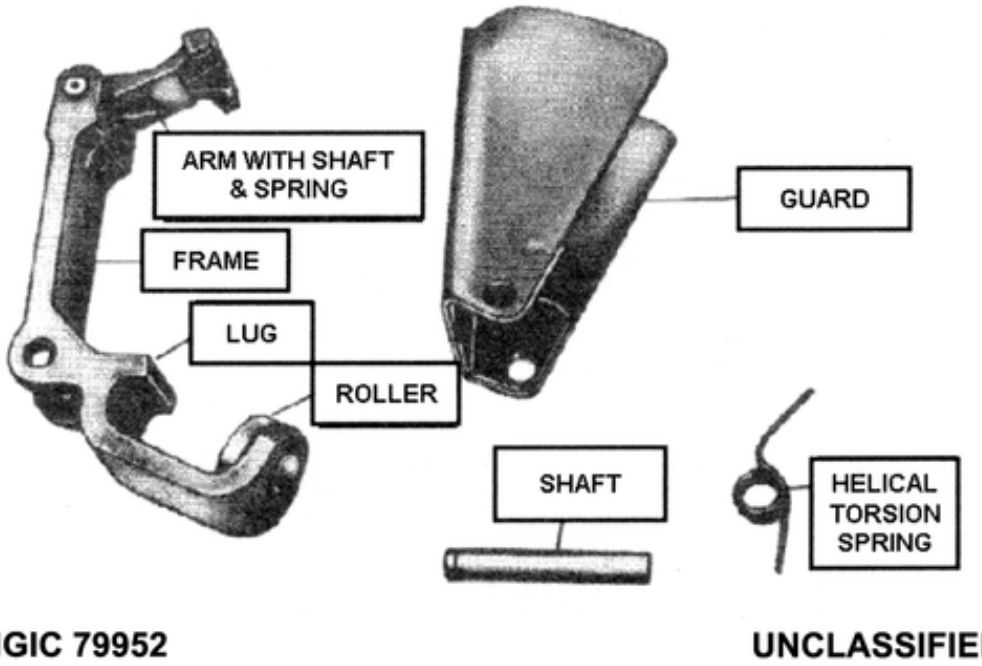

Figure 1-21. Feed Pawl Assembly

The feed pawl frame has a lug that slides along the groove on the right side of the slide. The roller with its pin fits into the groove on the left side of the slide. The feed pawl arm has three teeth on its underside. The guard protects the feed pawl frame from mechanical damage and dirt and closes the recess on right side the feed plate.

Cartridge Retainer Pawl. The cartridge retainer pawl holds the link belt back and prevents cartridges from being jammed against the guide lugs of the feed plate. It consists of the frame, the pin, and spring (shown in the receiver cover assembly, see figure 1-17).

Gas Block Assembly. The gas block assembly (see figure 1-22) with the gas regulator serves to direct the propellant gases diverted from the barrel and to regulate the amount of propellant gases acting on the slide piston.

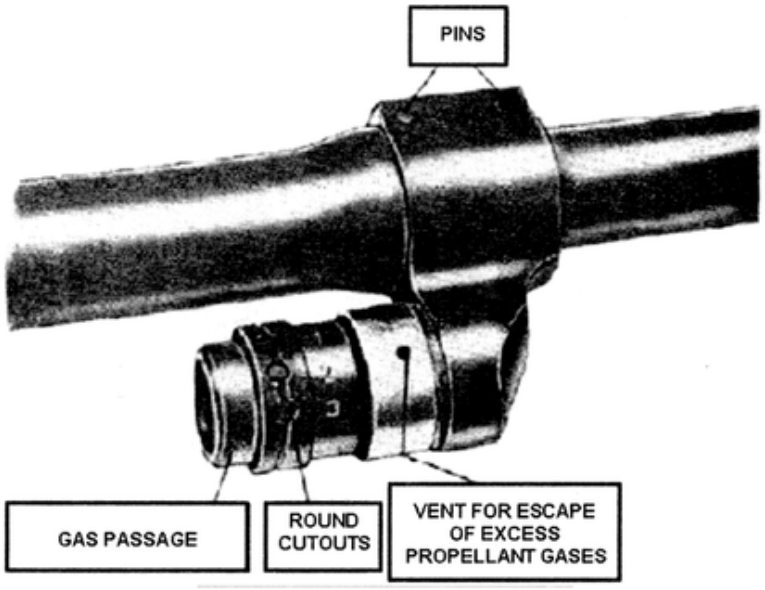

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Figure 1-22. Gas Block Assembly

The gas block assembly slips onto the barrel and is fastened with two pins. On the bottom in the elbow joint of the block there is a hole which allows the passage of the propellant gases from the barrel. The front ring has a vent for the escape of excess propellant gases. The rear ring has three round cutouts and a round groove. The arms of the gas regulator fit into the cutouts and groove. The round cutouts are marked “1”, “2” and “3”, and indicate the three positions of the gas regulator on the gas block. Position “1” is used after 3000 rounds have been fired from the machinegun and is the basic position of the gas regulator. Position “2” is used in case the slide does not return fully to the rear position, and position “3” is used when the machinegun is fired in adverse conditions (low temperature, rain, when the machinegun is dirty from propellant gas products, etc.) and during the first 3000 rounds. The rear section of the gas block fits into the gas cylinder.

Gas Regulator. The gas regulator (see figure 1-23) has two vents on the sides: on the left side there is an elongated opening, and on the right side there is a round hole. The openings serve to release the propellant gases from the gas port. When the regulator is in position “1” both vents are open; in position “2” only the left vent of the gas block is open; in position “3” both vents are closed. There are two rectangular lugs on the sides of the gas regulator which facilitate its being switched from position to position. The gas regulator arms fasten it to the gas block. On the ends of the arms are small studs that fit into the round cutouts and round groove on the gas block. On the bottom of the regulator there is a profiled lug with a groove in which the rim of a cartridge case fits. The cartridge case and groove are used to adjust the regulator from position to position when this cannot be done with the fingers (see figure 1-24).

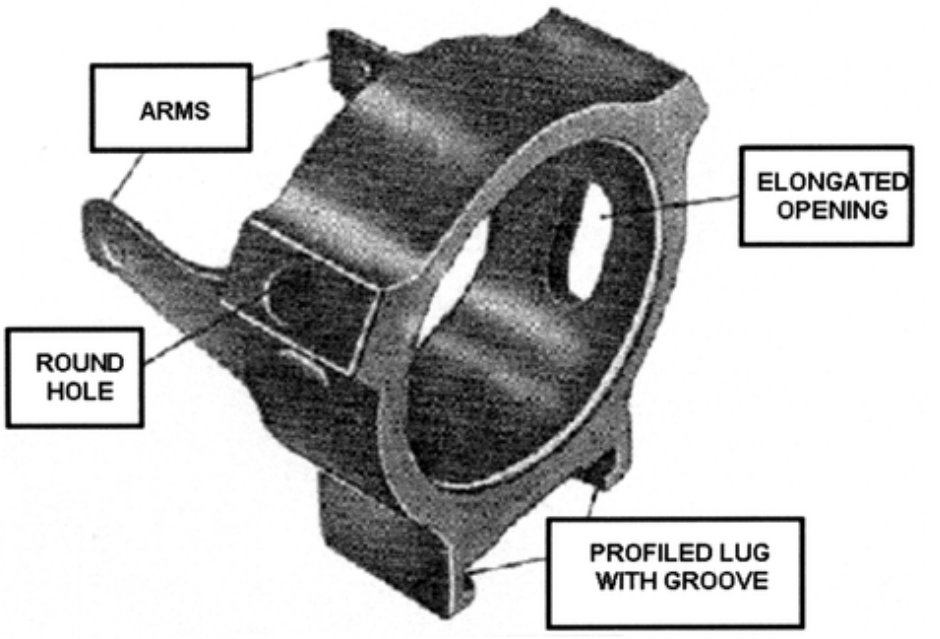

Figure 1-23. Gas Regulator

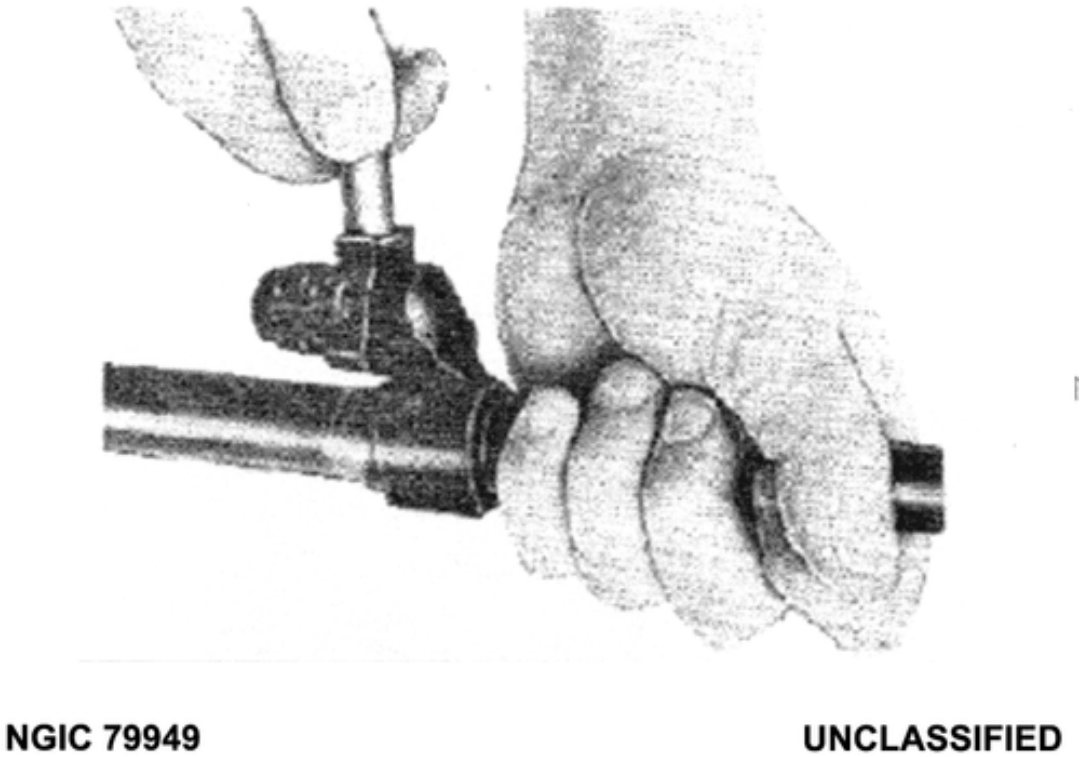

Figure 1-24. Adjusting the Gas Regulator

Gas Cylinder. The gas cylinder (see figure 1-25) serves to direct action of the slide and piston and for fastening the bipod.

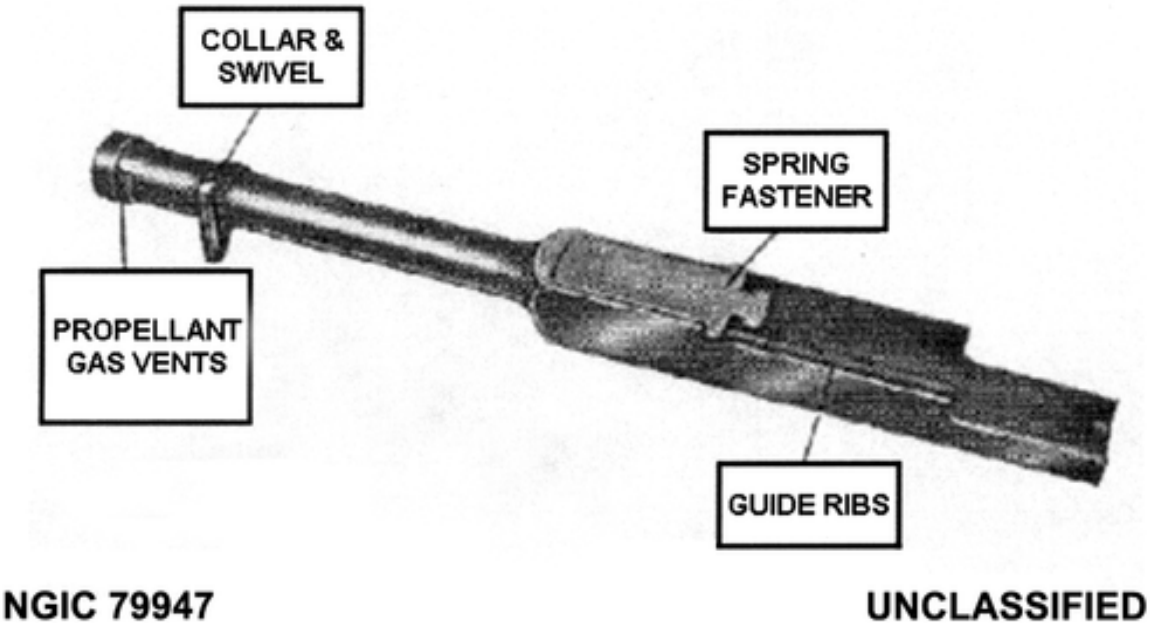

Figure 1-25. Gas Cylinder Assembly

The rear part of the gas cylinder has a rectangular shape for the passage and correct guiding of the slide, and the front part is cylindrical for the passage and guiding of the slide piston. The upper rear face of the gas cylinder is cut out. At the front end of the cutout is a spring fastener which fastens it to the receiver. The fastener at the rear end is a profiled lug which fits into the vertical slot in the barrel socket. On the sides of the gas cylinder there are two guide ribs which fit into the longitudinal grooves on the barrel socket. The upper rear of the gas cylinder is cut away in the shape of a rectangle to allow the movement of the cocking lever. A swivel for attaching the front end of the sling is on the front cylindrical end. In front of the collar there is a round groove and in front of it a ring with a cutout which serves to fasten the bipod. There are four holes for the escape of propellant gases on the ring.

Operating Rod Assembly. The operating rod assembly (see figure 1-26) serves to return the slide and piston to the forward position. It consists of the spring guide rod, the driving spring, and the support plate.

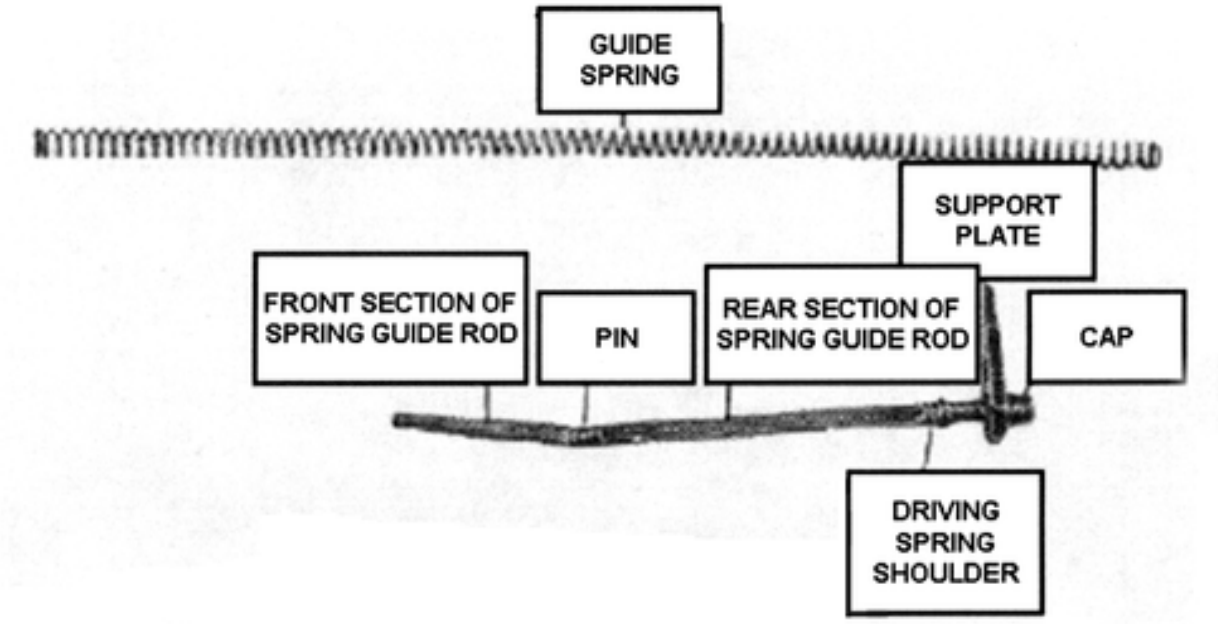

Figure 1-26. Operating Rod Assembly

The spring guide rod consists of the front and rear parts which are joined by a pin. On the rear there is a shoulder against which the driving spring rests. The support plate serves to reduce the impact of the slide frame in the rear position. The plate slips onto the rear end of the spring guide rod and is fastened from behind with a cap. The cap is fastened on the rear end of the spring guide rod with a pin and serves to stabilize the support plate; and it also serves as a lug for joining the operating rod to the receiver frame. The support plate has a hole for bore sighting when testing the accuracy and precision of the machinegun.

Slide and Piston Assembly. The slide and piston assembly serves to house the bolt, extract cartridges from the link belt, lock the bolt from below when it is in the forward position, absorb the force of the propellant gases, unlock the bolt, and return it to the rear position, as well as to cock the trigger mechanism. The slide with piston (see figure 1-27) consists of the frame, piston, and the cartridge extractor.

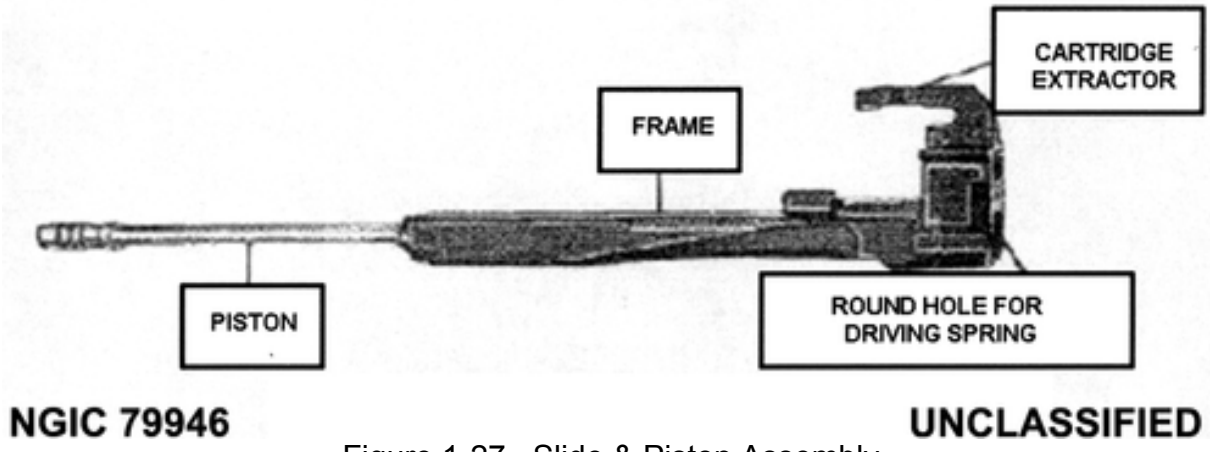

Figure 1-27. Slide & Piston Assembly

Frame. The frame has a hole in the back for the driving spring, a lug with a hole for the pin of the cartridge extractor, and a hole for the bolt body. On the interior surface of the hole for the bolt body there is a semicircular groove for guiding the lug of the firing pin during locking and unlocking.

On the sides of the slide frame there are grooves that guide the motion of the slide frame along the curved sides of the receiver. The right groove has a further slot in it which allows passage of the ejector. On the top of the lug of the slide frame is a lateral groove with two teeth which holds the cartridge extractor. On the upper rear, in front of the extractor lug, there is a spiraled groove for the profiled lug of the bolt. On the left side of the spiraled groove is a beveled lug onto which the beveled face of the profiled lug of the bolt fits. On the bottom of the slide frame there is a cutout lug which is held by the sear tooth when the slide is in the rear position and the trigger is not pulled. On the sides of the frame grooves have been cut out for guiding the feed pawl. On the right side of the frame is a lug which the cocking lever tooth catches. On the front of the frame are profiled lugs for attaching the piston.

Piston. The piston serves to absorb the pressure of the propellant gases and transfer it to the slide frame. The rear of the piston has a shoulder which fits into the profiled lugs of the slide. The slide and piston are joined by a pin. On the front of the piston there are rings and grooves for sealing the gas block. The rear or guide ring guides the motion of the piston in the gas cylinder.

The cartridge extractor fits onto the lug on the slide frame and is fastened with a pin. Its bottom has a profiled lug, and its top has two claws with a vertical slot for catching the cartridge case rim.

Bolt Assembly. The bolt assembly (see figure 1-28) serves to feed the cartridge into the chamber, close the barrel, ignite the primer cap of the cartridge, and extract the cartridge case. It consists of the body, the firing pin, and the extractor.

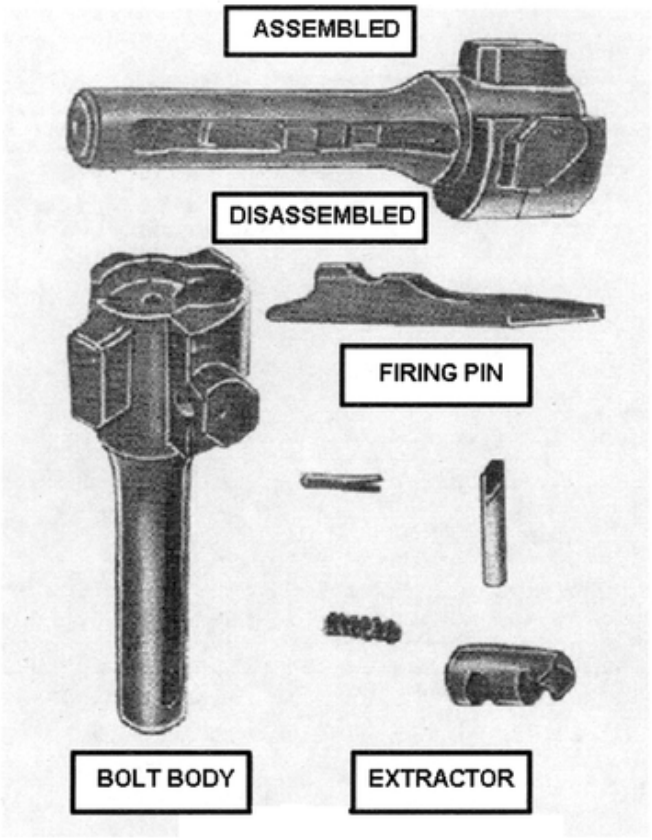

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Figure 1-28. Bolt Assembly

On the front of the bolt body there is a round cutout for the cartridge head and an oval cutout for the extractor. In the round cutout there is a hole for the firing pin. On the top of the bolt body there is a semicircular lug on which there is a smaller profiled lug. Under the profiled lug there is a round hole which holds the extractor shaft. On the side of the body there is a rectangular lug which allows the bolt to be locked and unlocked, and a longitudinal groove along which the ejector tooth slides. The lower part of the bolt is the shaft which feeds the cartridge.

The extractor consists of the body, helical compression spring, shaft, and pin. The firing pin has a lug which guides it through the bolt body and allows easy removal.

Front Sight Assembly. The front sight assembly (see figure 1-29) consists of the following components: the base, the blade housing, and the blade. The base is pulled onto front of the barrel and fastened with three pins. The top of the base has the shape of a semicircular ring and serves as the sight blade guard.

Under the blade guard there is lateral hole which holds the blade housing. On the front side of the base, on a beveled recessed surface, there is a notch for checking the proper position of the blade housing. Below the beveled recess of the base there is a hole for the flash suppressor stud. The lower part of the base is ring shaped and slipped onto the barrel and has holes for the retainer pins.

The blade housing has a threaded hole where the blade is screwed into place. A line is engraved on the front side of the blade housing which is lined up with the notch on the beveled recess in the base. The blade is screwed into the hole in the base. Its lower part is split for a better fit into the housing.

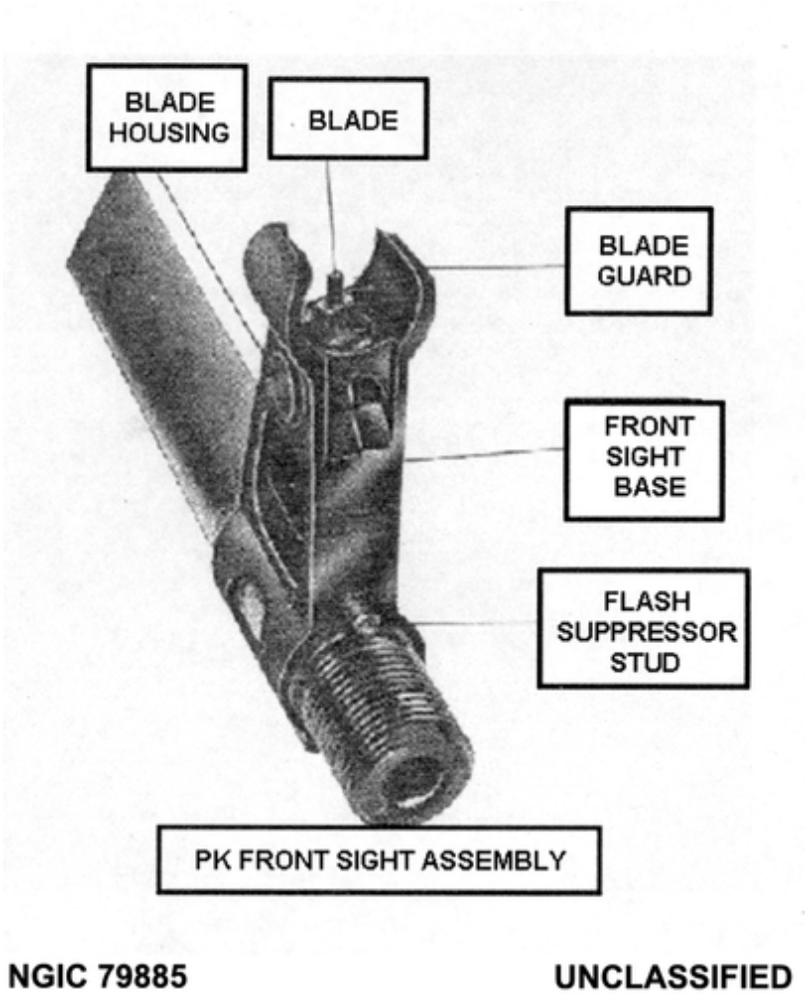

Figure 1-29. PK Front Sight Assembly

Rear Sight Assembly. The rear sight assembly (see figure 1-30) consists of the base, leaf, elevation knob, leaf spring, and sight bar assembly. The sight base is riveted onto the receiver cover. On the front of the sight base there is a projection which fits through the longitudinal rectangular slot in the receiver cover and functions as the cartridge stop. The top of the base is cut through in order to hold the leaf spring. The leaf and elevation knob serve to set the firing range. The upper surface of the leaf has an engraved scale with divisions representing values of 100 meters, in marks numbered 0–15. The “0” mark is used when engaging targets in the air.

The lower right side of the leaf is serrated to fit the tooth of the knob fastener. On the front of the leaf is the sight bar slot, which on the rear surface has a scale from 0–16 mils, on which each mark has a value of 2 mils (0–02). The elevating knob consists of the shank, fastener, and spring. The fastener has a tooth, which the spring presses into the notches on the right side of the leaf. The sight leaf spring is housed in the base and holds the leaf in the desired position by pressing its rear edge upward.

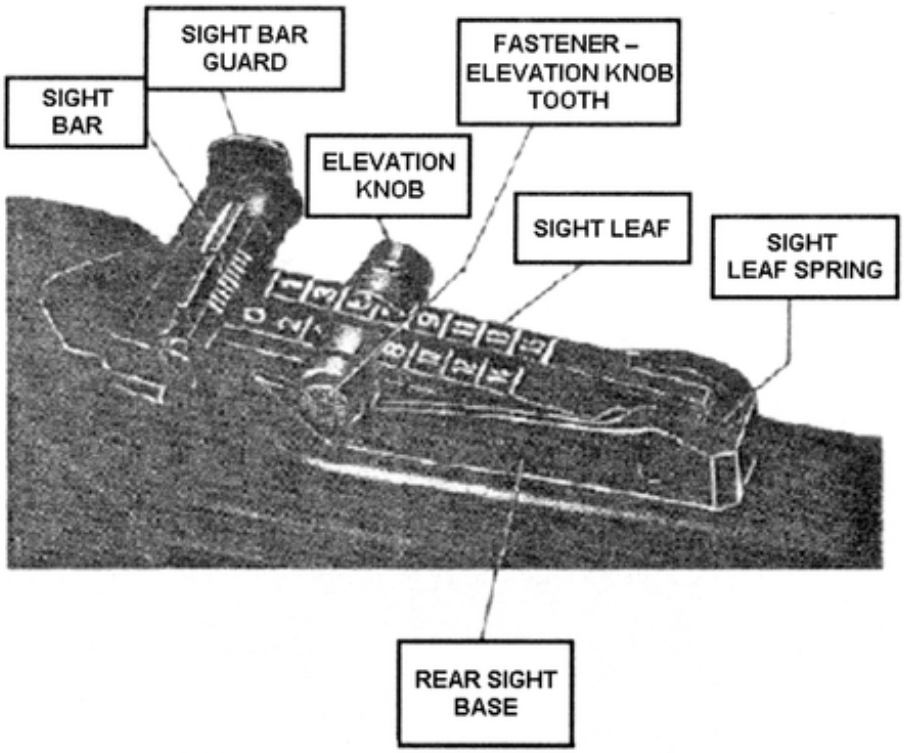

Figure 1-30. PK Rear Sight Assembly

Sight Bar Assembly. The sight bar assembly (see figure 1-31) serves to facilitate lead adjustment when firing on moving targets and for compensating for the effects of crosswind. It consists of the sight bar, spindle, drum, spring, and nut. The sight bar has an aperture in the center for sighting and is moved back and forth by the spindle when the drum is turned. In order to move the sight bar one division on the scale, the drum must be turned two full rotations. The spindle is threaded. The nut is attached to its end and fastened with the pin. The drum is slipped onto the spindle on the right side. Its rim is notched in order to facilitate turning, and on its left side there are two projections that hold it in the desired position. The spring is slipped over the spindle, and its ends rest against the nut and the drum.

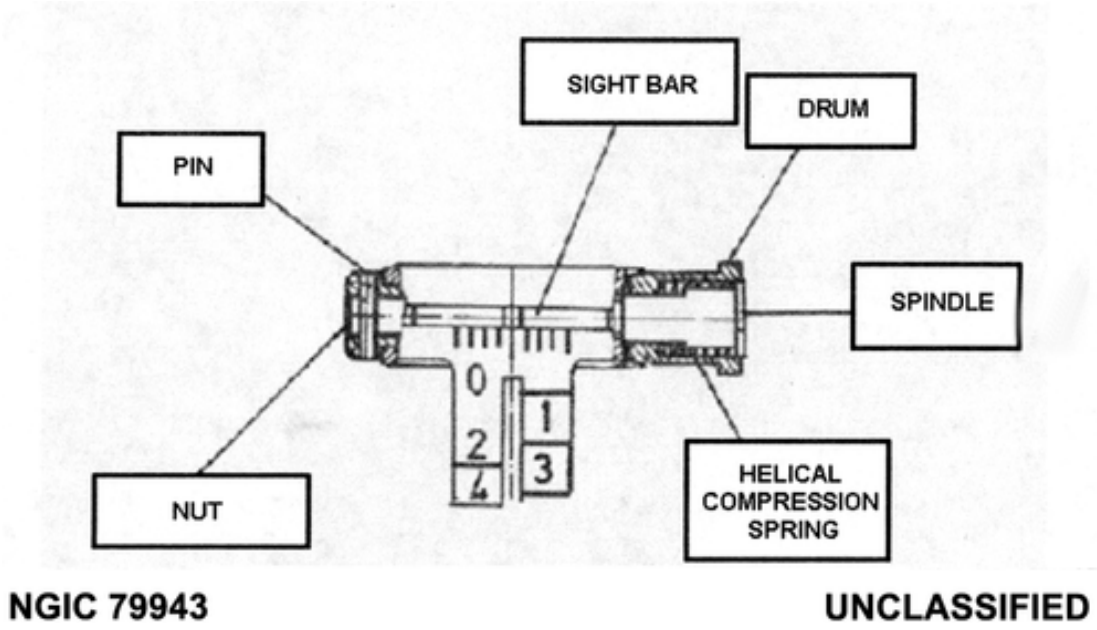

Figure 1-31. PK Sight Bar Assembly

Bipod Assembly. The bipod assembly (see figure 1-32) is used to support the machinegun if necessary when firing. It consists of the bipod assembly pivot, coupling, helical compression spring, leg lock, and bipod latch.

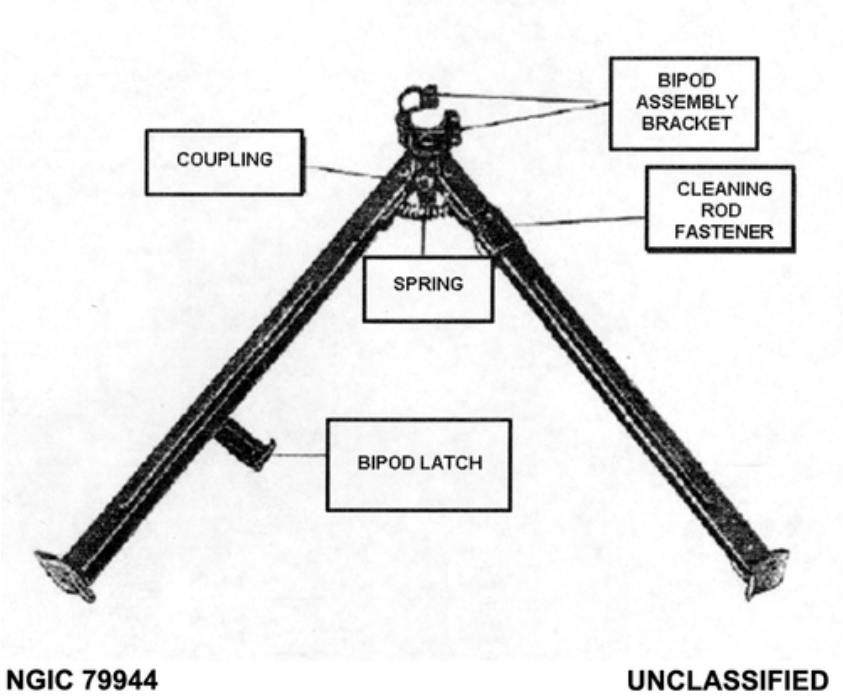

Figure 1-32. Bipod Assembly

The bipod assembly bracket consists of an upper part and a lower part which are joined with two pins through their lugs. On the bottom of the lower part there is a lateral oval opening which holds the beveled components of the bipod. The lower part of the bipod assembly bracket has a lateral hole for the coupling and a longitudinal hole for the coupling pin. On the front and rear of the lower part of the bipod assembly bracket there are slots for the bipod leg ribs when they are in the folded position.

The coupling joins the upper ends of the legs with the bipod assembly bracket and limits the sideward extension of the legs. It is fastened to the legs with pins.

The bipod legs end in the leg bottoms. The bipod latch is attached to the left leg with a wire fastener. The cleaning rod is located inside the right leg. The cleaning rod fastener is located in the upper end of the right leg and consists of body, pin, and spring.

When the legs are released from the bipod latch, the spring presses them apart.

Tripod Assembly. The tripod serves to provide increased stability of the machinegun when firing from various positions, to facilitate firing at targets in the air and firing at linear and deep targets with sweeping fire. The tripod (see figure 1-33) consists of the following components: cradle, attachment for firing at targets in the air, cradle mount, base, and legs.

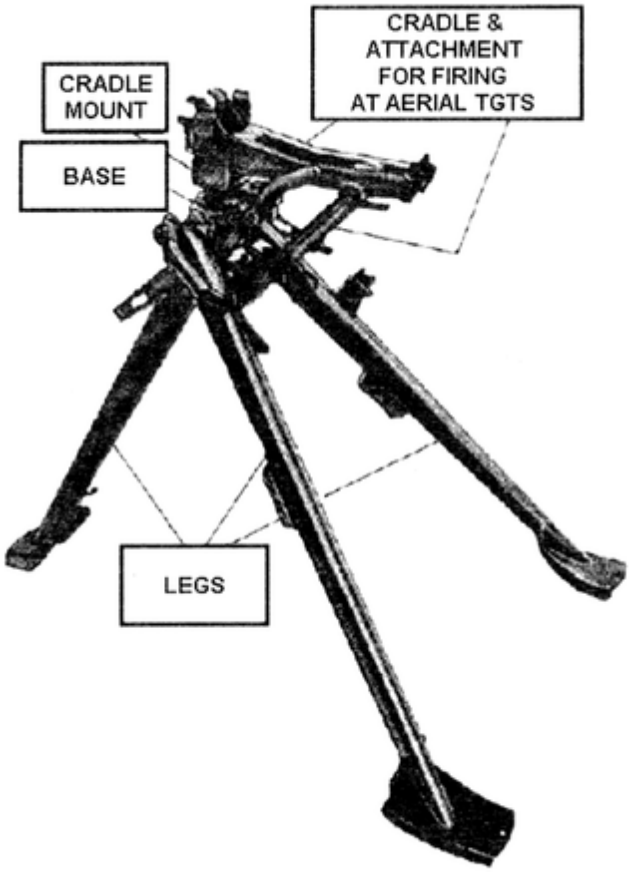

Figure 1-33. Tripod Assembly

The cradle and aerial target attachment (see figure 1-34) serves to fasten the machine gun to the tripod, to facilitate firing at targets on the ground and in the air, and firing at targets with depth. It consists of the following components: the cradle frame, attachment for firing at targets in the air, and precision elevating mechanism.

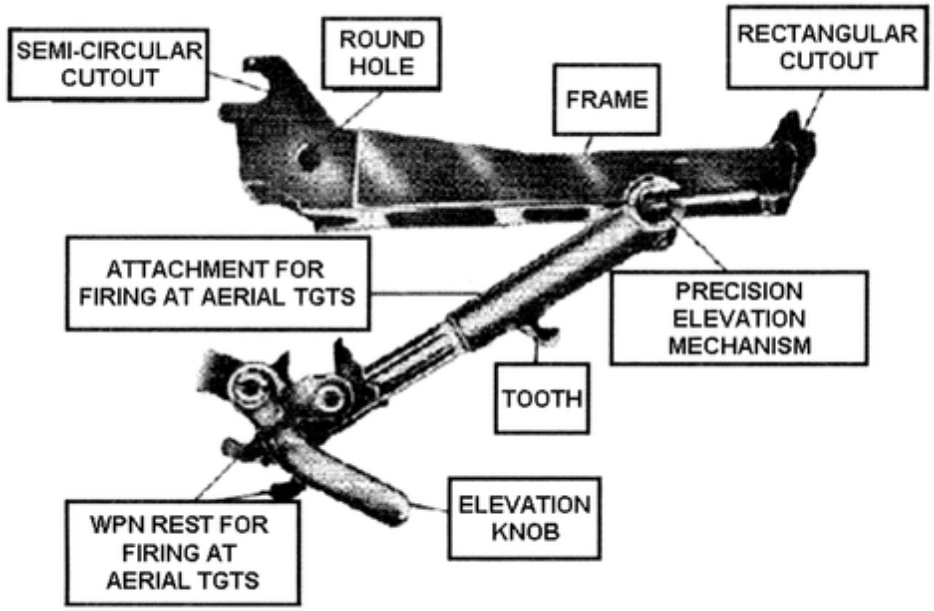

Figure 1-34. Cradle & Aerial Target Attachment

On the front end of the cradle frame there are lugs with semicircular cutouts into which the studs of the barrel socket fit. On the sides of the front part of the frame there are round holes which hold the machine bolts, which join the cradle frame with the cradle mount. Washers and nuts are affixed to the machine bolts. On the front of the cradle frame there is a profiled opening which holds the cradle latch when the machinegun is set up for firing at targets in the air. On the rear of the cradle frame there are lugs with rectangular cutouts which hold the front end of the trigger mechanism. Under the lugs there is a latch for the lug on the trigger mechanism housing and trigger guard and for the tooth on the support of the attachment for firing at targets in the air. The latch consists of the lever, shaft with tooth, spring, and pin. On the rear of the cradle frame there are round lugs for fitting the precision elevation mechanism and for attaching the device for firing at targets in the air.

A line is stamped into the left round lug; the notch on the handle of the precision elevation mechanism is aligned with the line. There is a semicircular rib which limits the movement of the handle of the precision elevation mechanism.

a) **Aerial Target Attachment.** The attachment for firing at targets in the air (see figure 1-34) serves to establish a stable link between the cradle frame and the pintle of the cradle mount when the machinegun is set up for firing at targets on the ground and to enable the machinegun to be fired at targets in the air. It consists of the support and rest for firing at targets in the air.

   The support has on its upper end a housing with which it is joined with the cradle frame. In the middle of the support is a tooth used to fasten the machinegun when firing at targets in the air. The lower end of the support has a smaller profile

and has longitudinal ribs which allow better fastening of the rest for firing at targets in the air. The elevation stop is slipped onto the support and fastened with a pin. The stop prevents the rest (for firing at targets in the air) from falling off the support.

The rest for firing at targets in the air serves to join the support with the cradle mount pintle and allow firing at targets in the air. It consists of two spring couplings (one large, one small), the mount, the rest latch, and the locking device. The larger spring coupling joins the machinegun rest with the support, and the smaller spring coupling joins the machinegun rest with the cradle mount pintle. The upper end of the coupling consists of lugs with holes for joining it with the shaft of the rest latch. The lower end of the coupling is split for better expansion. The mount consists of the frame and two holders. The frame and the holders are joined together with shafts. The frame is joined with the rest latch shaft via the lugs with holes. The mount frame has two internal and two external lugs. The internal lugs fit onto the edge of the support stop and prevent the mount frame from slipping down when the machinegun is set up to fire at targets in the air. The external lugs limit the movement of the holders downward. On the inner right side of the rest mount there is a round stud which fastens the mount onto the larger flexible coupling when the machinegun is set up for firing at targets on the ground. The mount holders on the upper edge has semicircular lugs with slots and fit onto the shoulders of the barrel socket when the machinegun is set up for firing at targets in the air. The rest latch joins all components of the rest for firing at targets in the air. It consists of the shaft, nut, and handle. A washer and a spring washer fit under the nut and ensure that the nut will not come loose. The shaft screws into the handle. The locking device is slipped onto the latch and keeps the smaller flexible coupling from falling off the cradle mount pintle when the machinegun is set up for firing at targets on the ground. It consists of the lever with tooth and the spring.

b) **Precision Elevation Mechanism.** The precision elevation mechanism (see figure 1-35) serves to join the aerial fire addition and the cradle frame to allow accurate sighting with respect to elevation and firing at deep targets (the range of operation is 15 mils). It consists of the eccentric shaft, handle, nut washer, and spring washer.

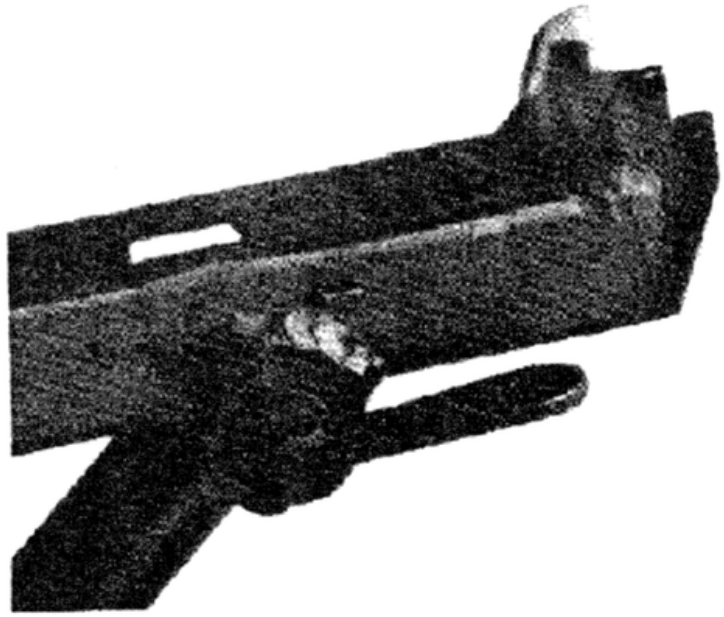

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Figure 1-35. Precision Elevation Mechanism

The handle is joined to the shaft with a pin. On the edge of the handle there is a notch which is aligned with the line on the round lug of the cradle frame. A locking device is built into the bottom of the shaft and moves along a groove in the round lug of the cradle frame.

c) **Cradle Mount.** The cradle mount (see figure 1-36) serves to join the cradle with the base and allows the machinegun to be traversed. It consists of the pintle, the traversal mechanism, and the cradle latch. The pintle in the upper part has two arms with holes for fastening it to the cradle frame. On the rear of the pintle there is a lug with a hole for fastening the traversal latch. On the top of the pintle is the housing for the cradle latch. The lower part of the pintle is threaded to receive the nut, and there is a longitudinal groove for the tooth of the stop of the rest for firing at targets in the air. The pintle is fastened on the tripod base with a nut, a flexible serrated cap, a washer, and a pin.

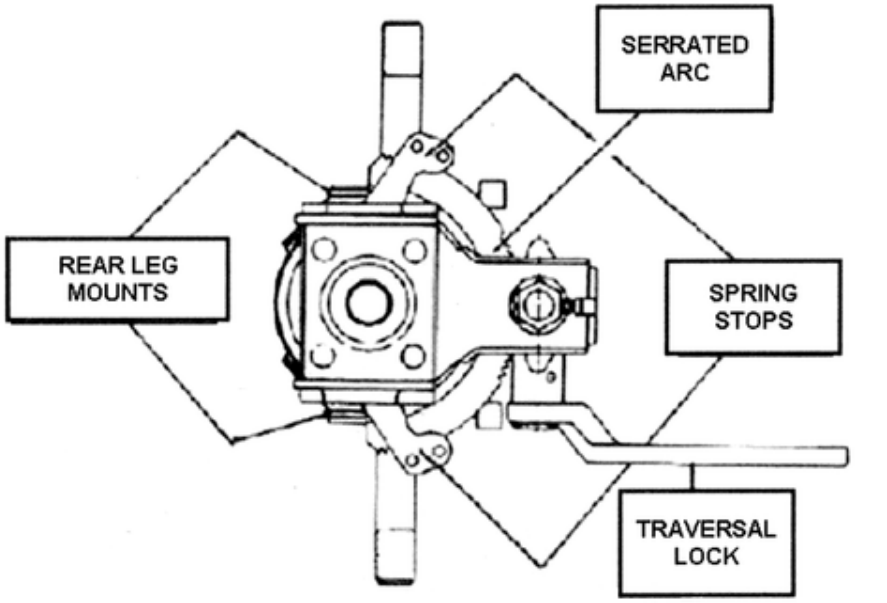

Figure 1-36. Cradle Mount & Base

d) **Traverse Mechanism.** The traversal mechanism consists of the serrated arc, two spring stops (left and right), the locking device, and nut. The components of the traversal mechanism are slipped onto the forward leg mount and fastened with a nut. The serrated arc has 58 teeth. The total value of the arc is 70°, and the value of one tooth is 2° 52' and 12" (about 0–50). The spring stops have curved lugs, which prevent the stops from being passed in case they slip out of the serrated arc. On the bottoms of the stop arms there are serrated plates fastened with two rivets. The locking device fastens the serrated arc and prohibits it from moving laterally. The transversal latch fastens the cradle in a given position. It consists of the offset handle, nut, washer, stop, clamp, and cotter pin. The stop serves to catch against the spring stops with its edges when the machinegun is traversed. The cradle latch consists of the body, pin, and spring.

e) **Base.** The base (see figure 1-36) joins all components of the tripod. It consists of the two rear leg mounts, the front leg mount, the separation cap, and four spring washers. The rear leg mounts are serrated on their exterior sides for a form fit with the legs when they are locked with the latches. On the back they have lugs which fix the upper- and lowermost positions of the legs. On the bottom of each mount is a semicircular lug which limits the spread of the leg to the side. The front leg mount is serrated on each side; the separation cap, rear leg mounts, and the traversal mechanism components slip onto it. The serrated sides have lines stamped into them with which the lines on the legs are aligned. The aligned lines indicate the position of the front leg in the sitting position and when firing at targets in the air. The lug on the right serrated side limits the lower- and

uppermost position of the leg. The separation cap, with the spring washers, fixes the positions of the leg mounts.

f) **Legs.** The legs (see figure 1-37) serve to ensure the stability of the machinegun when firing and taking up various positions. They are fastened to the base with latches. Each leg latch consists of the handle, shaft, nut, and two flat washers. The nut screws onto the shaft and is secured with a cotter pin.

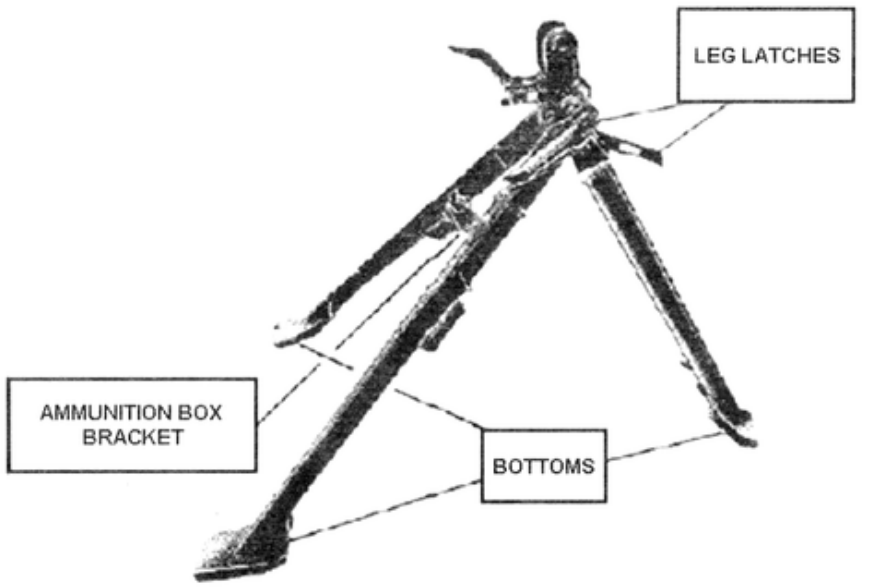

Figure 1-37. Tripod Legs

The leg bottoms ensure the stability of the tripod. The rear legs have carrying rests, and each has two swivels for the slings when the tripod is carried. The right leg has the bracket for the ammunition box and two stops. There are round holes on the leg bottoms through which the karabiners for the ammunition box straps are attached.

Section II. Technical Data

All technical data listed below, unless specified, is for the Soviet / Russian PKM machinegun.

a. Weapon

Caliber	7.62x54R mm
Operation	Gas
Fire type	Fully automatic Only
Cyclic rate of fire	690-720 rpm (6P41–650 rpm)
Practical rate of fire	250 rpm
Overall length	1190 mm / 47 inches (6P41-1164 mm)
Weight unloaded	8.4 kg / 18.5 lbs (6P41-8.2 kg)
Max range	3800 m
Max effective range	1000 m (6P41-1500 m)

b. Feed.

Type	Belt; non-disintegrating links
Location	Right to left
Belt capacity	25-250 rounds (connectable 25-rd sections)

c. Barrel.

Length	60.3 cm/23.75 in
Approximate muzzle velocity	835 ms/2741fps (6P41–825 ms)

d. Sights.

Front type	Protected cylindrical post
Rear type	Rectangular notch, tangent ramp
Rear sight graduation	100-1500 m in 100-m increments;
Battle setting	330 m
Adjustment	Front sight: zero only Rear sight: elevation & windage

e. Action.

Locking feature type	Rotary bolt
Full automatic	Fires from open bolt
Trigger type	Spur
Safety type	Rotary selector (safe or fire)
Safety location	Left side trigger guard

f. Stock.

Type	Fixed
Material	Wood (laminated)

Section III. Operation

Loading the Non-disintegrating Belt. The ammunition belts for the PK machinegun initially are preloaded at ammunition factories in 25-cartridge, connectable belt lengths. Unloaded belts also come in 100-, 200-, and 250-cartridge lengths. To reuse the non-disintegrating belt lengths, the belt must be hand loaded.

To hand load the belt, insert a 7.62x54R cartridge, one at a time, into each opening of the belt from the large section of belt to the small section. Push the round completely forward into each opening. A cartridge is completely seated when the front ridge of the cartridge is aligned with the front of the smallest portion of the belt (see figure 3-1).

Figure 3-1. Non-Disintegrating Belt and Proper Seating of Ammunition in Belt

WARNING: This weapon cannot utilize NATO 7.62x51-mm ammunition unless it is specifically calibrated to fire NATO ammunition. Consult table 8-1 in Section VIII of this manual for appropriate types of ammunition.

An improperly loaded cartridge (see figure 3-2) may cause the belt to feed incorrectly or cause the round not to chamber properly. Either of these actions will cause a stoppage.

Figure 3-2. Improper Seating of Ammunition in Belt

Normal safety precautions of handling small arms ammunition should be observed at all times. Careful insertion of each round should avoid any accidental striking of the primer.

Loading the PK Machinegun. Keep the weapon pointed in a safe direction. Place the selector lever, located on the left-hand side of the weapon to the forward (fire) position (see figure 3-3). Depress the feed tray cover latch, located at the rear of the receiver, and raise the feed tray cover to the fully open position. Place the belt on the feedway, ensuring that the rim of the first cartridge is in the cartridge gripper, located at the center rear of the feedway (see figure 3-4). The charging handle and bolt will be in the forward position. Close the feed tray cover of the weapon, ensuring that the receiver cover latch is engaged (see figure 3-5).

> **CAUTION:** During operation, if the receiver cover is not closed and the receiver cover latch is not engaged, damage to the receiver cover and operator may occur by the blow back action of the bolt and expended cartridge. Additionally, the weapon selector is in the fire position during the loading process—the operator should place the selector lever weapon back in the safe position once he completes loading the weapon if is he is not going to immediately fire his weapon.

Figure 3-3. PK Selector Lever in Fire Position

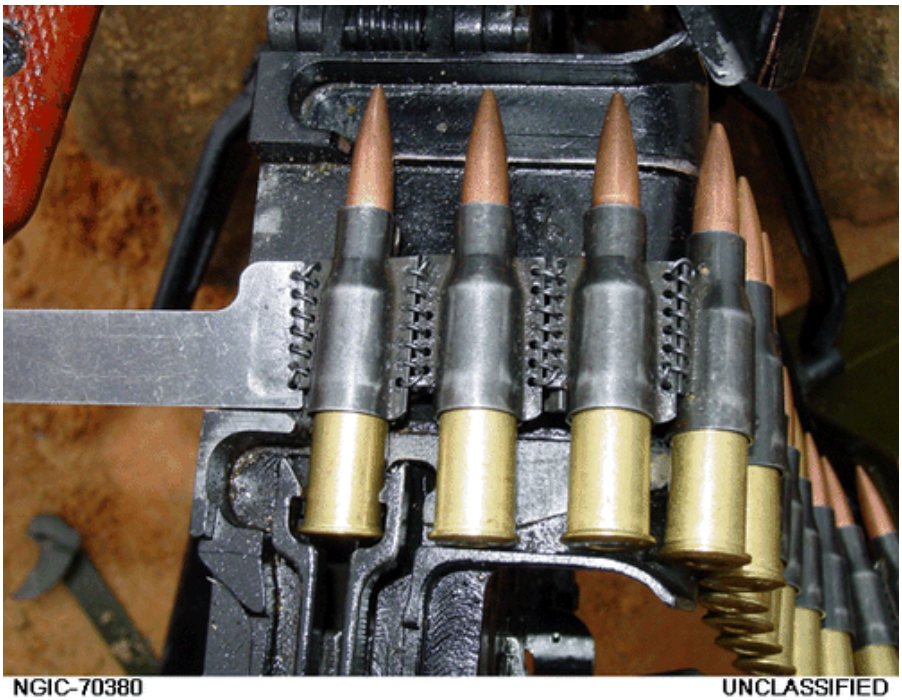

Figure 3-4. Proper Seating of Ammunition Belt in Weapon

Figure 3-5. Receiver Cover Properly Closed

Firing the PK Machinegun. Pull the charging handle, located on the right side of the weapon, completely to the rear. This will extract the first round of ammunition from the belt. This action places the first cartridge in position on the bolt face. Return the charging handle to the forward position. The PK is now ready for firing. Note: To ensure that the charging handle is seated properly, it a slight push forward with the palm of the right hand (see figure 3-6).

Figure 3-6. Charging Handle in Forward Position for Firing

Aim the weapon at the desired target. Pull the trigger, firing the weapon in 6- to 9-round bursts. Note: Firing the PK in short 6- to 9-cartridge bursts allows the barrel to cool and prolongs the life of the barrel. Test results have shown that continuous fire of more than 260 cartridges significantly increases the possibility of a cook-off (heat of barrel exploding a chambered cartridge).

Unloading the PK Machinegun. Keep the weapon pointed in a safe direction. Place the selector lever, located on the left-hand side of the weapon to the rear (safe) position. Depress the feed tray cover latch, located at the rear of the receiver, and raise the feed tray cover to the fully open position. Lift the ammunition belt out of the feedway and remove the single cartridge from the cartridge gripper. It may be necessary to swing the feed tray up and press this cartridge out of the feed lips in the tray.

Clearing the PK Machinegun. Keep the weapon pointed in a safe direction. Place the selector lever, located on the left-hand side of the weapon to the forward (fire) position. Depress the feed tray cover latch, located at the rear of the receiver, and raise the feed tray cover to the fully open position. If an ammunition belt or cartridge is present remove the ammunition belt out of the feedway and remove the single cartridge from the cartridge gripper. It may be necessary to swing the feed tray up and press this cartridge out of the feed lips in the tray. Pull the operating handle rearward, inspect to ensure that no cartridges are present, grasp the operating handle, and press the trigger; ease the operating mechanism forward. Close the cover and rotate the selector lever rearward (safe).

Immediate Action: A malfunction is a failure of the weapon to function as designed. Defective ammunition or improper operation of the weapon by an operator is not considered a malfunction of the weapon. The three most common malfunctions of the PK machinegun are misfires, runaway guns, and sluggish operation.

- Cool^{-1} Weapon Misfire Procedures—Keep the weapon pointed in a safe direction (up and down range). Then pull the charging handle to the rear and extract the misfired cartridge. Release the charging handle, loading a new round and attempt to fire it. If the weapon still does not fire, inspect the extracted cartridges for indications that the primer of the cartridge has been struck. If it has, the ammunition is probably faulty, and a new lot of ammunition should be selected. If the round shows no indication of being struck, inspect the bolt assembly and firing pin for damage.

- Hot^{-2} Weapon Misfire Procedures—Keep the weapon pointed in a safe direction (up and down range) for at least 5 minutes before re-cocking the weapon and extracting the misfired round. This procedure is incorporated as a safety factor to reduce the possibility of a cook-off. After the 5-minute waiting period, follow the steps as outlined in the Cool Weapon Misfire Procedures to continue firing the weapon.

- Runaway Gun & Corrective Procedures—A runaway gun is a weapon that continues to fire after the trigger is released. It may be caused by a worn sear, worn sear notch, or a short recoil (operating group recoils to feed and fire but not sufficiently enough for the sear to engage the sear notch). Short recoil may also be caused by loss of gas or excessive carbon build-up in the operating rod. Keep the machinegun pointed in a safe direction (up and down range) until all ammunition is expended or twist the ammunition belt to cause a stoppage. Clear the weapon and inspect it to determine the cause of the malfunction—check the gas port plug, gas cylinder extension, and clean the operating rod. Replace parts as necessary.

- Sluggish Operation & Corrective Procedures—Sluggish operation of the weapon usually is due to excessive friction caused by dirt or carbon, lack of proper lubrication, burred parts, or excessive loss of gas. Clean and lubricate the weapon, then inspect for burred parts and replace if necessary.

[-1] Cool Weapon = <200 cartridges fired
[-2] Hot Weapon = >200 cartridges fired

Barrel Quick Change. The changing of barrels prolongs the life of the barrel and equalizes barrel wear. There are three rates of fire with a machinegun: sustained, rapid, and cyclic. These rates indicate when a barrel change is desired.

- Sustained Fire. 100 cartridges per minute in bursts of 6 to 9 rounds with a 4- to 5 second interval between bursts. A barrel change is recommended after firing the sustained rate for 10 minutes.

- Rapid Fire. 200 cartridges per minute in bursts of 6 to 9 rounds with a 2- to 3-second interval between bursts. A barrel change is recommended after firing the rapid rate for 2 minutes.

- Cyclic Fire. 700 cartridges per minute or the maximum rate of ammunition which can be expended in 1 minute. A barrel change is recommended after firing in excess of rapid fire for 1 minute.

Conduct a quick barrel change with the PK machinegun in the following manner:

- Unload the weapon.
- Maintain the feed tray cover in the open position and swing the feedway up (pivots on same pin as the receiver cover).
- Push the barrel locking latch completely to the left-hand side of the receiver (see figures 3-7 and 3-8). Pull the barrel carrying handle away from the barrel (see figure 3-9); this will lever a hot barrel out of its seat in the receiver, then pull the barrel forward, completely off the gun (disengaging the barrel from the barrel receiver group).
- Insert a new, cool barrel, seating it fully – ensure the gas tube is properly seated (see figure 3-10). Press the barrel lock fully in and close the feed tray cover.
- Reload and resume firing.

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Figure 3-7. Barrel Locking Latch in Locked Position

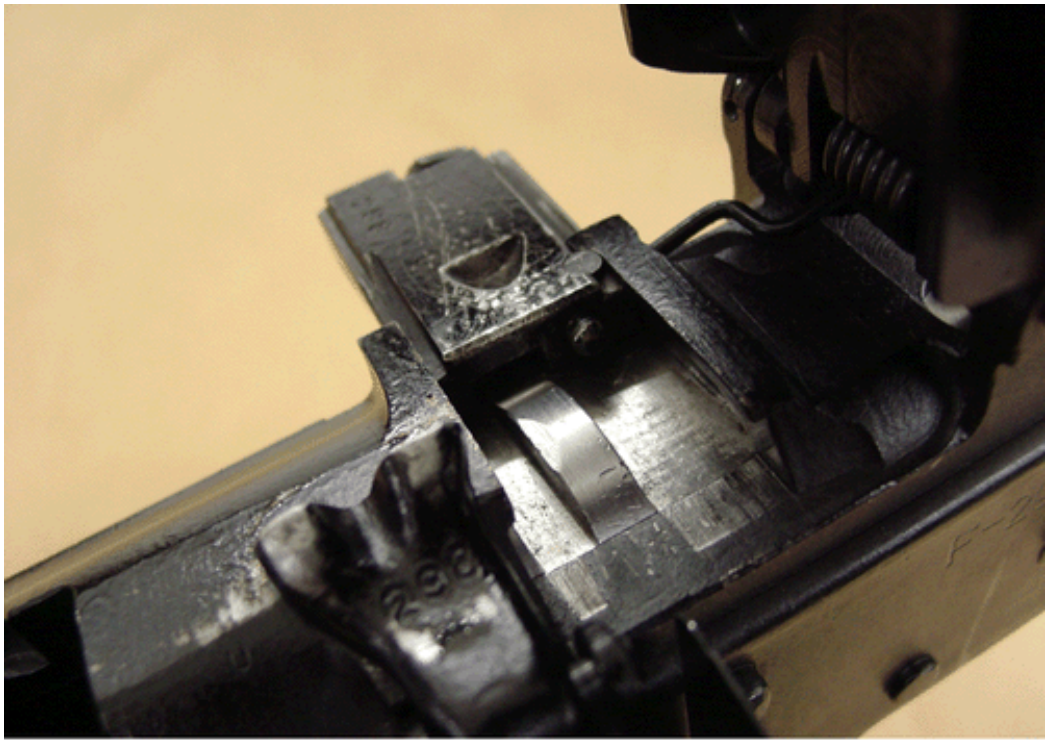

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Figure 3-8. Barrel Locking Latch in Unlocked Position

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Figure 3-9. Barrel Quick-Change Handle and Barrel Pulled Forward from Barrel Receiver

Figure 3-10. Gas Tube Seated

Zeroing the PK-series Machinegun. Listed below are the established "Testing the Mechanical Sights" procedures as outlined in the Yugoslavian (U) Manual for the M84, 7.62-mm Machinegun, dated 1989. Some of the data is re-phrased in order for the reader to easily understand.

The precision and accuracy of the machine-gun are tested by opening semi-automatic or automatic fire from a bipod or only automatic fire from the tripod mount. After the firing has been completed, group spread and position of the central shot (CS) in relation to the control point (CP) are determined separately for every type of fire.

Training Target. A 1 x 1 meter training target is used with a target for testing the accuracy and precision of a machine gun (see figure 3-11). The target is in the shape of a rectangle 35 cm high and 25 cm wide. The aiming point (AP) is at the center of the lower edge of a black rectangular and has to be level with the firer and weapon. A different color is used to mark the point that represents the central shot, or control point (CP), 25 centimeters above the aiming point. 10 and 20 cm-radius rings are drawn around the control point.

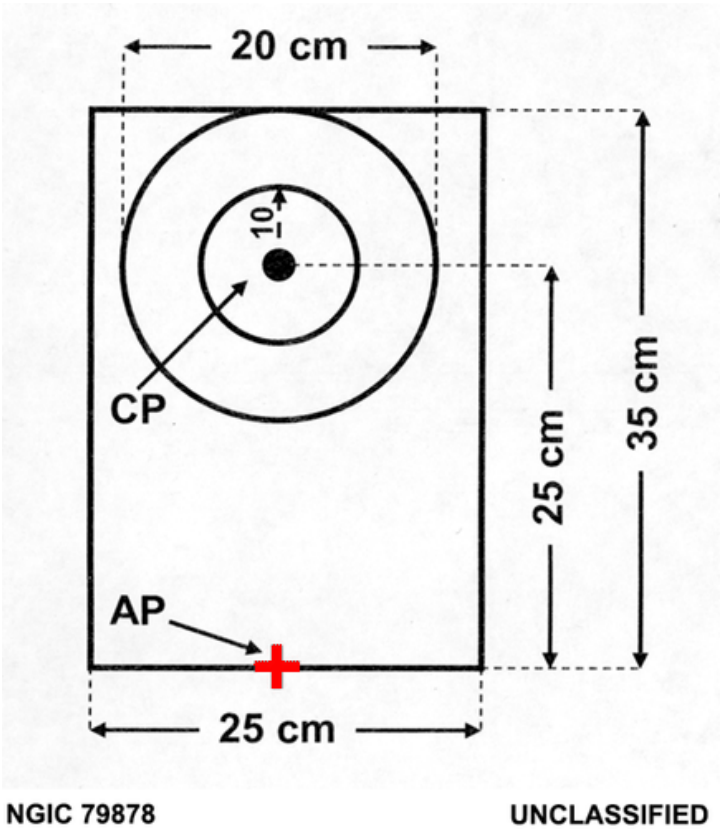

Figure 3-11. M84 Training Target

Correct Sight Picture**.** Aiming with a mechanical sight means that the gunner will bring into a straight line the eye, the rear sight, the blade, and the aiming point (target). The blade must be brought into the center of the aiming notch, and its tip aligned with the upper edge of the notch (see figure 3-12).

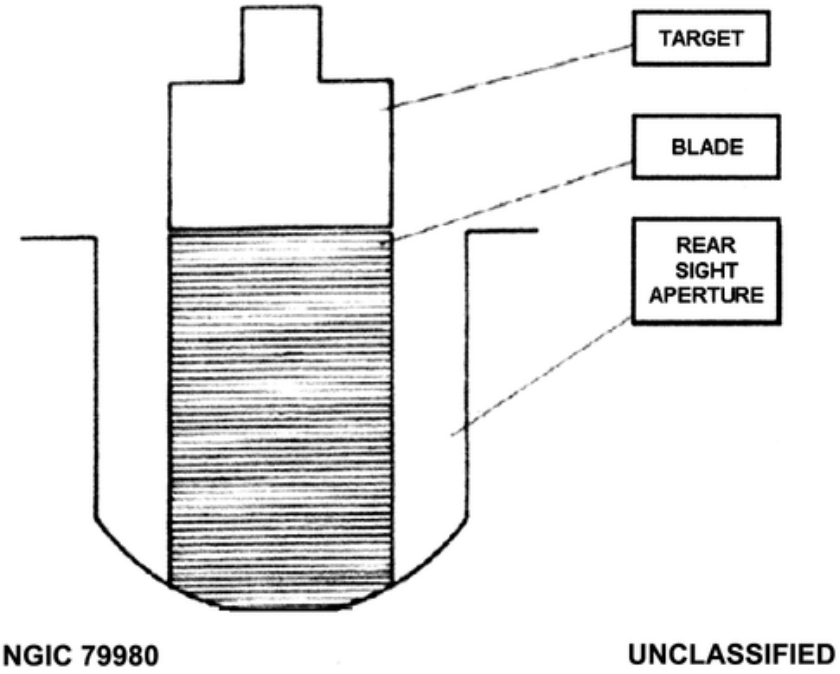

Figure 3-12. Correct Sight Picture

If one of the actions from the basic rules of aiming is performed incorrectly, shot dispersion will occur.

Different light intensity during the day, the position of the sun, and the weather can influence aiming. Strong light makes objects appear bigger, so the gunner instinctively draws the blade into the notch, and the illumination of the notch or the blade when there is a lot of sunshine causes reflection of the light, owing to which their real shape is lost, and they appear bigger. The gunner eliminates these errors by focusing observation on the spot where the reflection occurred, which will make the real position of the component (notch, blade, or target) visible, owing to the accommodation of the eye (adjustment of the lens in the eye to various sight distances).

During aiming, one eye can be closed, depending on the habit of the individual soldier. If the gunner uses both eyes during aiming, the possibilities of observation are better, there is less strain and the sharpness of vision is not reduced. It is important that the gunner uses his stronger (direction) eye for aiming and decides during training whether or not to close one eye while aiming.

In order to fire, the gunner, while keeping the alignment in place, slowly, and with even strength, pulls the trigger until firing occurs. The gunner's breathing rhythm significantly influences the shooting result, especially when the machinegun is not fixed during firing and when no bipod is used. The breathing follows the movement of the rib cage, the stomach, and the entire shoulder belt, which causes ordnance to move. Because of this, the gunner breathes out and holds his breath before firing. The gunner must practice firing 7 to 10 seconds after he stops breathing.

The gunner must pull the trigger with a steady motion of his index finger, while holding the grip with his hand in order to create sufficient support for overcoming trigger resistance. The grip must be held firmly, but not too tense, because muscle strain can cause the weapon to move. Pull the trigger with the first knuckle of the index finger straight to the rear and gradually increase pressure. The time from starting to pull the trigger until firing should not be longer than 1.5 or 2.5 seconds.

Bipod Semi-automatic Fire Zero.

- Zeroing the weapon is conducted by firing 4 x ball ammunition cartridges from the same lot of ammunition. All fire is conducted in single shots.
- The weapon is zeroed on a firing range at 100 meters with the rear sight setting at '3' and the sight bar division set on basic (the notch on the sight bar with a white line is placed opposite the middle notch on the scale).
- The position for firing is prone, bipod supported.

Semi-automatic fire zero standards. The machinegun is adequately precise and accurate if at least three out of four shots fall within a 15-cm-radius ring, and the group center is not outside the 5-cm-radius ring. Shots that touch the ring on the outside are also considered valid.

Determining CS. When the firing has been completed, the target is checked and the group size (precision) is determined as well as the position of the CS (accuracy) – marked by a red 'X' in the examples (see figures 3-13 and 3-14).

If precision is inadequate (loose spread), the chain of command will determine its causes. Once the cause has been established and the machinegun has been repaired, the same marksman fires again. In the event of another large dispersal, another marksman fires the same machinegun. If no desired precision is achieved, the firing is interrupted, and the machinegun is sent in for repair as imprecise. Three group pictures are sent along with the weapon.

Once satisfactory precision is achieved, the accuracy of the machinegun is determined by establishing the central shot in the group spread, determining its position and how much it deviates from the control point. The central shot (CS) for a group of four shots is determined in the following way (see figure 3-13):

- Connect the two closest shots with a straight line and divide the distance between them in two equal parts (the point in the middle is their central shot).

- Connect the central shot of the first two shots with the third one and divide the distance between them into three equal parts. The point closest to the central shot of the first two shots is the central shot of these three shots.
- Connect the central shot of the three shots with a straight line with the fourth shot and divide it into four equal parts. The point closest to the central shot of the first three shots is the central shot of the entire group.

In order to determine the position and the deviation of the CS from the control point (CP) more accurately, draw a vertical and a horizontal line through the CP and establish the position of the CS (left, right, underneath or above). The horizontal and the vertical deviation of the CS is measured with a ruler.

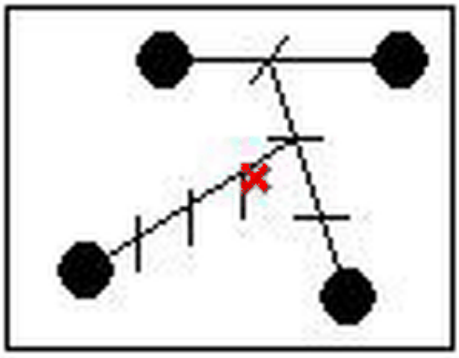

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Figure 3-13. Determining the CS

When the group spread is symmetrical, the central shot is determined according to figure 3-14.

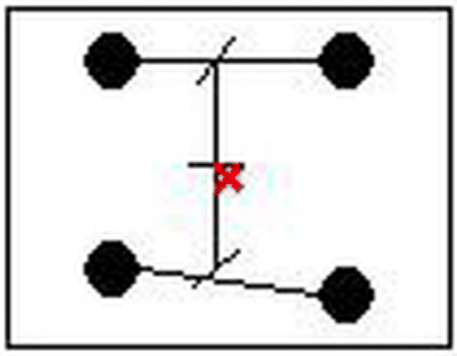

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Figure 3-14. Determining the CS

Bipod Automatic Fire Zero.

- Zeroing the weapon is conducted by firing 10 x ball ammunition cartridges from the same lot of ammunition. Fire is conducted in three to four short bursts.
- The weapon is zeroed on a firing range at 100 meters with the rear sight setting at '3', and the sight bar division set on basic (the notch on the sight bar with a white line is placed opposite the middle notch on the scale).
- The position for firing is prone, bipod supported.

Automatic fire zero standards. The machinegun is considered sufficiently precise and accurate if at least 7 out of 8 shots falls within a 20-cm-radius ring, and the CS does not deviate from the control point more than 5 cm to either side. Shots that touch the ring on the outside are also considered valid. If adequate precision is not achieved with automatic fire, repeat the zero procedures.

Determining CS. When opening automatic fire the CS is determined by counting half a number of shots up or down the vertical line (either above or down) and drawing a horizontal line, and then counting half a number of shots (from right to left) and drawing another vertical line (see figure 3-15). The point where the vertical and the horizontal lines cross is the position of the CS when a number of rounds are fired in bursts.

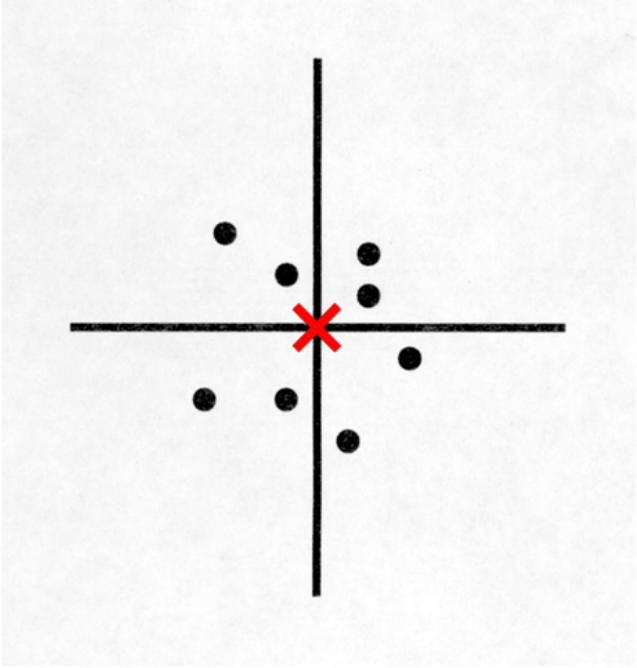

Figure 3-15. Determining Central Shot

The precision of the machinegun when firing automatic fire does not depend only on the proper functioning of the machinegun but also on the experience and the proficiency of the sight setter. In controversial cases, when the sight setter has influenced the precision, testing has to be repeated.

Adjusting the Weapon's Zero. When the shot group is satisfactory and the CS deviates from the CP more than 5 cm, the sights are changed in accordance with the format below:

Elevation –

- If the CS is lower than the CP (point of aim), rotate the front sight post down (clockwise).
- If the CS is higher than the CP (point of aim), rotate the front sight post up (clockwise).

Windage –

- If the CS deviates to the right of the CP (point of aim, drift the blade base (front sight) to the right.
- If the CS deviates to the left of the point of aim, drift the blade base (front sight) to the left.

How much the blade base is moved (i.e., raised or lowered) depends on how much the CS deviates and the length of the aiming line as shown in tables 2 and 3.

Table 1. Windage-Zero Adjustments

CS deviation (cm)	**5**	**7.5**	**10**	**12.5**	**15**	**17.5**	**20**	**22**	**25**	**27.5**	**30**
Blade moved horizontally (mm)	**.33**	**.5**	**.66**	**.88**	**1**	**1.17**	**1.33**	**1.5**	**1.66**	**1.83**	**2**

Table 2. Elevation-Zero Adjustments

Rotation of blade (full circle)	**1/4**	**½**	**3/4**	**1**
Vertical deviation of CS (cm)	**3**	**6**	**9**	**12**

The operator adjusts the blade base or the elevation under the supervision of his supervisor. Move the blade base sidewise until it is aligned with the external surface of the front sight base.

After the blade base is moved or its elevation adjusted by means of rotation, re-fire the semi-automatic fire and automatic fire zero as outlined above. If this proves inadequate, make further correction, and repeat firing.

If owing to a significant deviation of the CS, the blade base needs to be moved to the right (or left) more than allowed, another marksman carries out the firing. If the results are the same, the testing is discontinued and the machinegun is sent in for repair as inaccurate.

If results are achieved with the semi-automatic fire zero, but the CS continues to be more than 5 cm away from the CP, the proper functioning of the machinegun must be

checked again in order to establish whether the error lies with the operator and his setting of the sights or the position of the machinegun in the firing emplacement. After this, the firing is repeated. If no satisfactory results are achieved, the machinegun is sent in for inspection and repair.

If the results achieved with automatic fire are satisfactory (CS not more than 5 cm away), the pattern of shots is copied from the target onto a piece of paper on the scale 1:5. The number of the machinegun, date, time, temperature, and height above sea-level are recorded on the copy of the target, which is signed by the range officer-in-charge. This data is submitted along with the technical manual of the machinegun to be consulted whenever information on precision and accuracy is required.

Tripod Automatic Fire Zero.

- Zeroing the weapon is conducted by firing 10 x ball ammunition cartridges from the same lot of ammunition. Fire is conducted in one 10-shot burst.
- The weapon is zeroed on a firing range at 100 meters with the rear sight setting at '3' and the sight bar division remains on the adjusted sight settings.
- The position for firing is prone, tripod supported. The traversal and elevation mechanism has to be set, and the stock supported on the shoulder.

Automatic fire zero standards. The machinegun is considered sufficiently precise and accurate if 8 out of 10 shots fall within the 20-cm-radius ring, and the CS is not more than 5 cm away from the CP. Shots that touch the ring on the outside are also considered valid. The firing can be repeated two or three times, and if no satisfactory results are achieved, the machinegun is sent it for repair.

If the machinegun is not precise enough and the CS falls more than one mil (0-01) from the CP, the distance between the CS and the CP is measured both horizontally and vertically. The resulting deviation in divisions of the rear sight and the deflection correction is recorded in the documentation and taken into consideration during tripod firing.

Section IV. Disassembly

It is necessary to disassemble, inspect, and clean the internal components to ensure proper functioning of the PK machinegun.

Preparation: Clear the weapon IAW the procedures outlined in Section III, but do not rotate the selector lever back to safe or close the feed tray cover. Place the weapon on a flat surface with the bipod legs extended.

Open the Feed Tray Cover: Grasp the weapon by the buttstock; with free hand press the feed tray cover catch forward and lift the feed tray cover to the fully open position. Raise the feed tray to the fully open position to expose the internal working parts (see figures 4-1 to 4-4).

Figure 4-1. Press Feed Tray Cover Latch

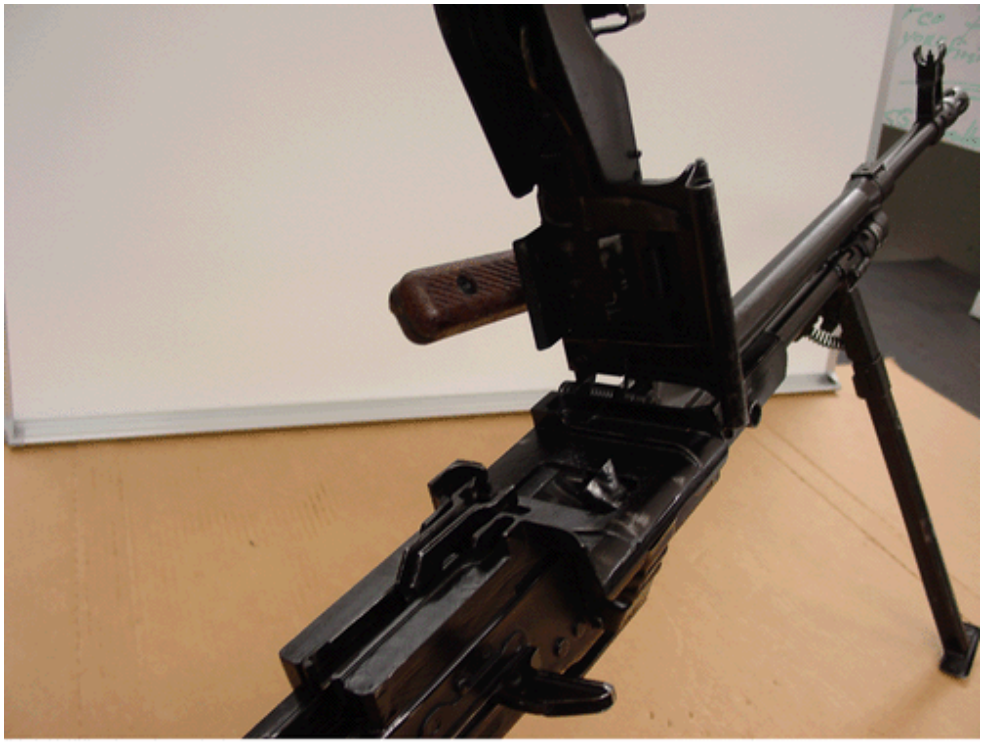

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Figure 4-2. Feed Tray Cover Open

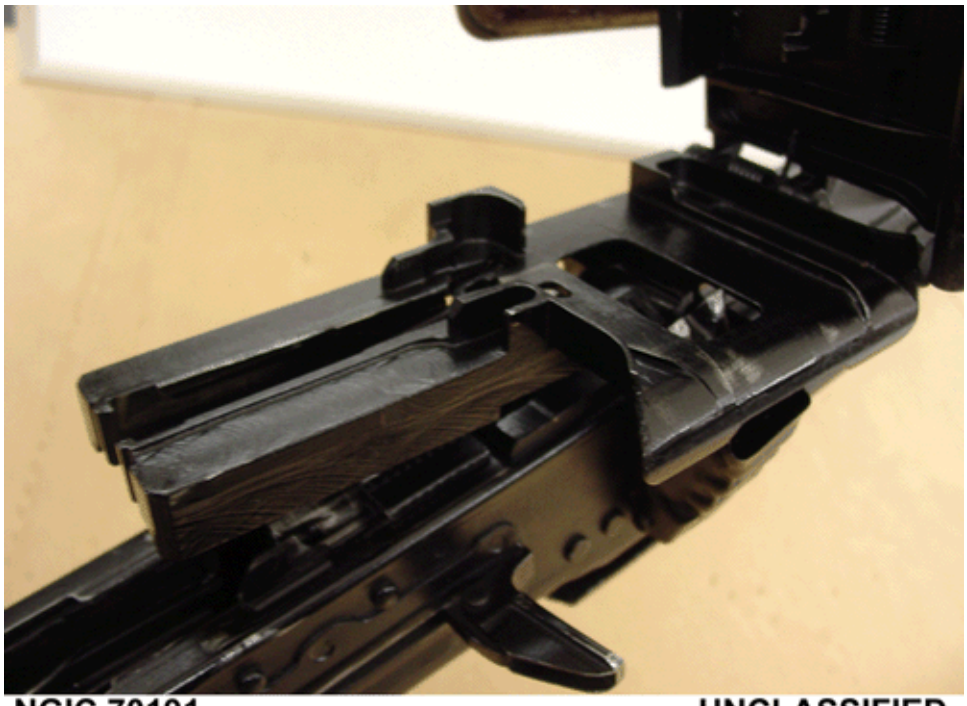

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Figure 4-3. Raising Feed Tray to Open Position

Figure 4-4. Feed Tray Raised to Full Open Position

Remove the Operating Rod Assembly (Driving Spring and Guide Rod): Maintaining the feed tray cover and feed tray raised, leave the sliding cam and piston (cartridge space gripper and bolt) in the forward position. Grasp the operating rod assembly; pushing forward, easing the operating rod assembly upward and out of the weapon (see figures 4-5 to 4-7).

Figure 4-5. Sliding Cam and Piston in Forward Position

Figure 4-6. Pushing the Operating Rod Assembly Forward to Release Spring Tension

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Figure 4-7. Lifting Driving Spring Rod Upward and to Rear

Remove the Bolt and Carrier: Grasp the bolt carrier by the cartridge space gripper and pull the entire unit rearward until the notches on the bolt align with the notches on the receiver, then lifting upward until it comes free of the receiver (see figures 4-8 to 4-10).

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Figure 4-8. Sliding Cam Pulled to Rear of Receiver

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Figure 4-9. Lifting Sliding Cam from Receiver

Figure 4-10. Lifting Sliding Cam and Piston from Receiver

Removing the Bolt from the Carrier: Rotate the bolt to the rear of the cam in a counter-clockwise motion. Pull the bolt forward while aligning the notch on the firing pin with the notch on the sliding cam (see figures 4-11 and 4-12).

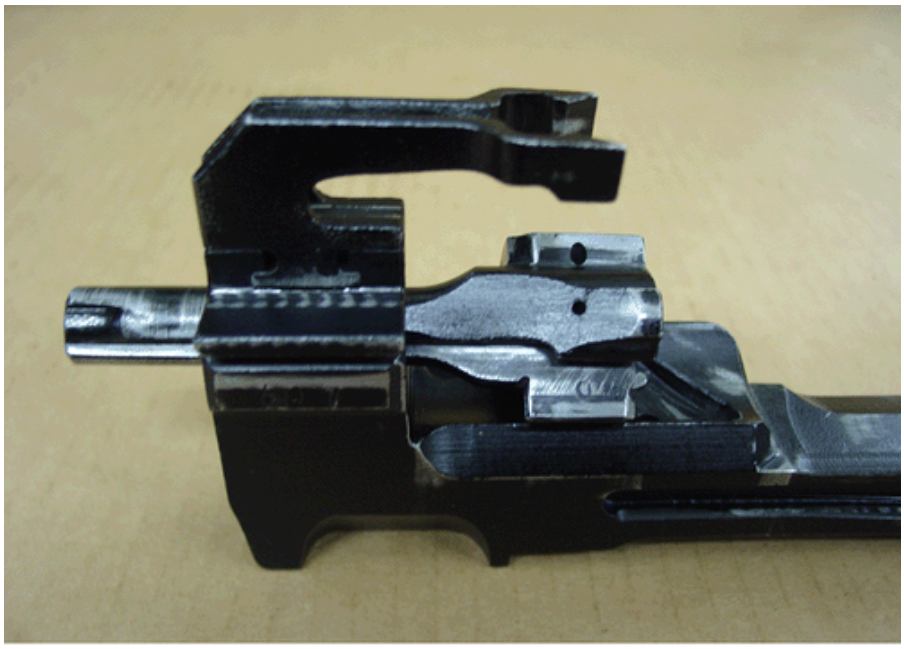

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Figure 4-11. Bolt Rotated to Rear of Sliding Cam

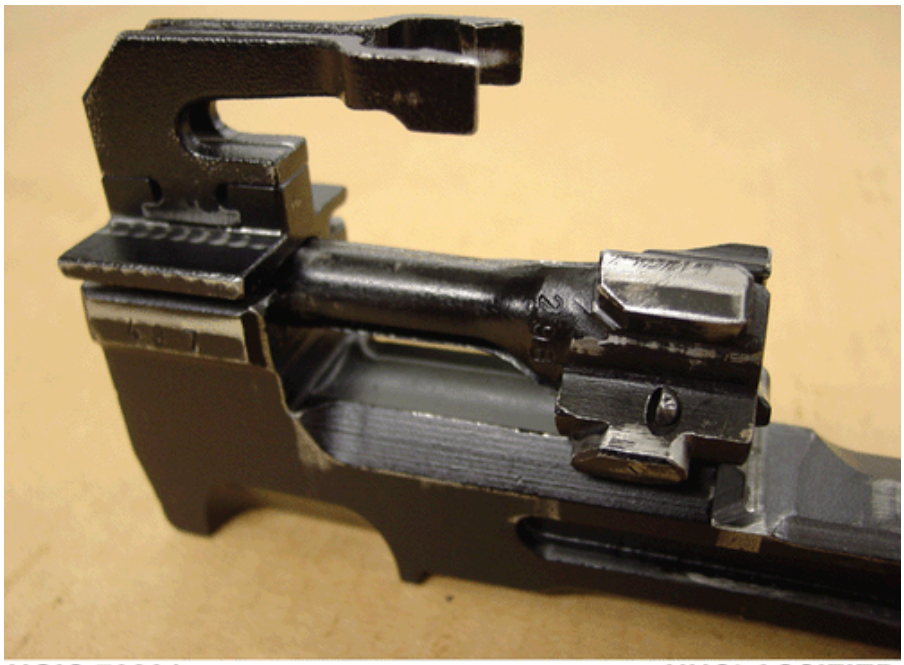

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Figure 4-12. Firing Pin and Bolt Notch Aligned with Sliding Cam Notch and Bolt Pulled Forward

Removing the Firing Pin from the Bolt: Push the firing pin to the rear of the bolt and rotate the bolt upside down extracting the firing pin (see figures 4-13 and 4-14).

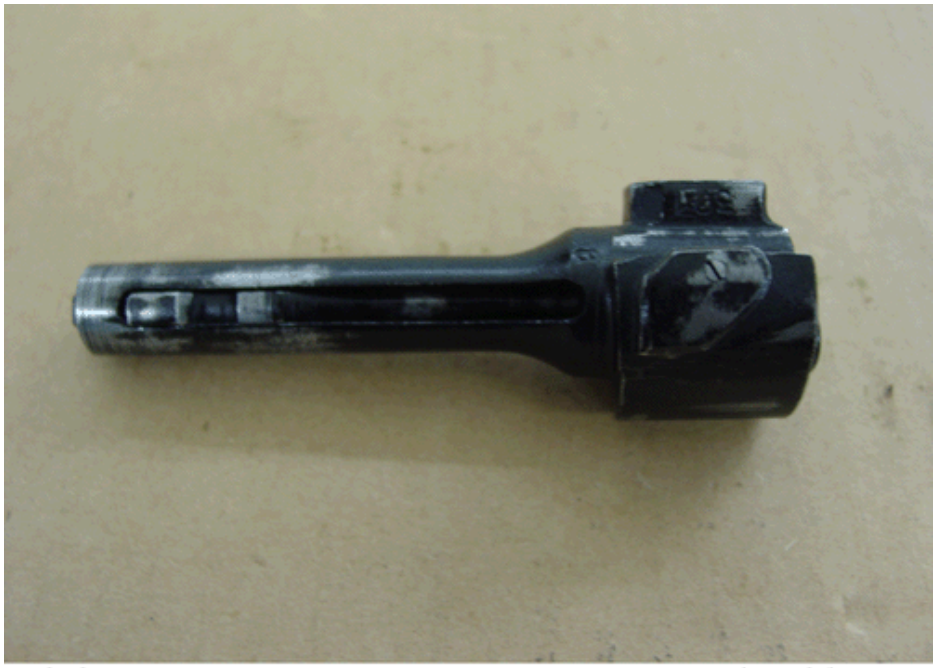

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Figure 4-13. Firing Pin Pushed to Rear of Bolt

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Figure 4-14. Firing Pin Extracted from Bolt

Removing the Barrel from the Receiver: Push the barrel locking latch completely to the left-hand side of the receiver. Grasp the barrel carrying handle and pull the barrel forward, disengaging the barrel from the barrel receiver group (see figures 4-15 - 4-18).

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Figure 4-15. Barrel Locking Latch in Locked Position

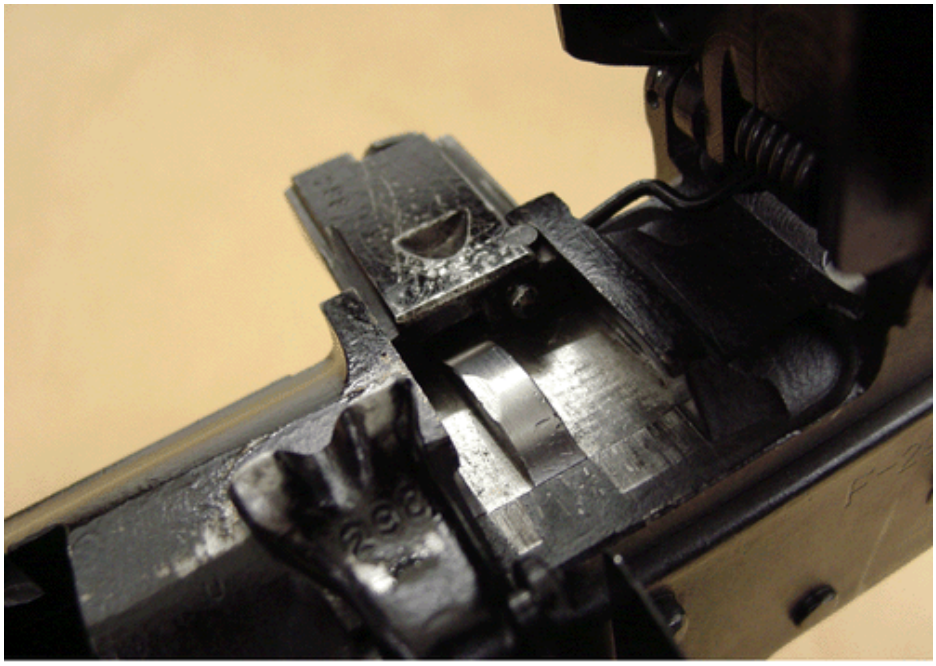

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Figure 4-16. Barrel Locking Latch in Unlocked Position

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Figure 4-17. Barrel Handle

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Figure 4-18. Disengaging Barrel from Receiver

PK Machinegun Field Stripped. The PK machinegun completely disassembled (operator level) for cleaning and inspection is shown in figure 4-19.

Figure 4-19. PK Machinegun Field Stripped

1. Receiver assembly
2. Operating rod assembly
3. Slide with piston
4. Firing pin
5. Bolt
6. Barrel assembly

Section V. Assembly

Preparation: Place the weapon on a flat surface with the bipod legs extended. Rotate the selector lever to fire. Do not close the feed tray cover.

Replace the Barrel from the Receiver: Ensure that the barrel locking latch assembly is in the fully open position, to the left-hand side of the receiver. Grasp the barrel carrying handle and pull the barrel rearward, inserting the rear of the barrel into the barrel receiver group while aligning the gas escape chamber located on the bottom of the barrel with the gas regulator on the bottom of the barrel receiver group. Close the barrel locking latch by sliding the barrel locking latch to the right of the receiver. This will lock the barrel in place (see figures 5-1 – 5-3).

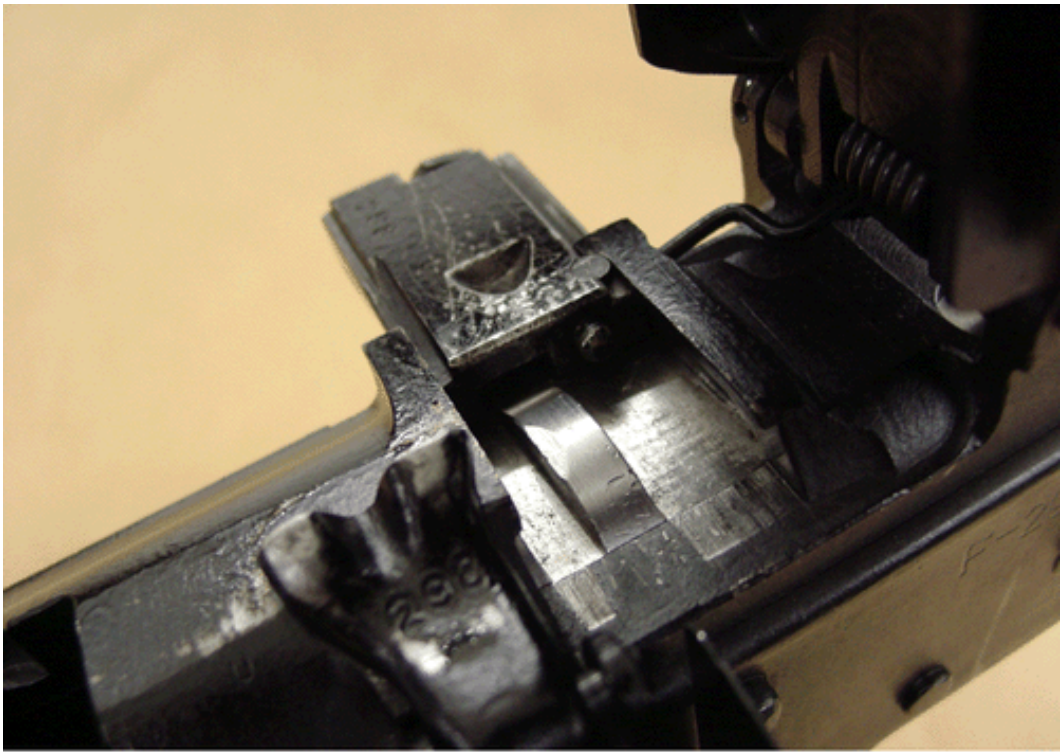

Figure 5-1. Barrel Locking Latch in Fully Open Position

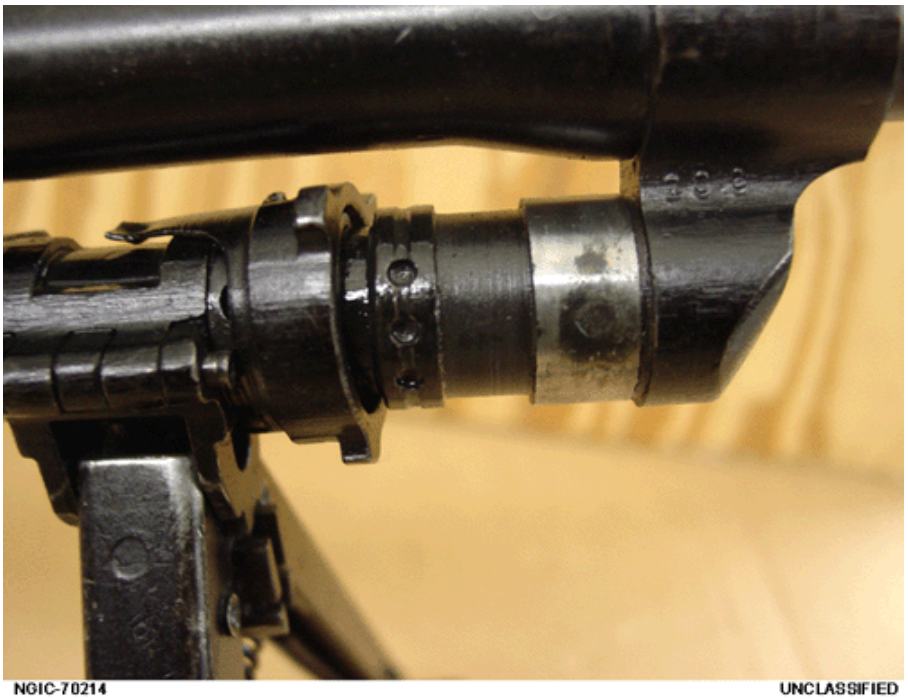

Figure 5-2. Gas Escape Chamber Aligned with Gas Regulator

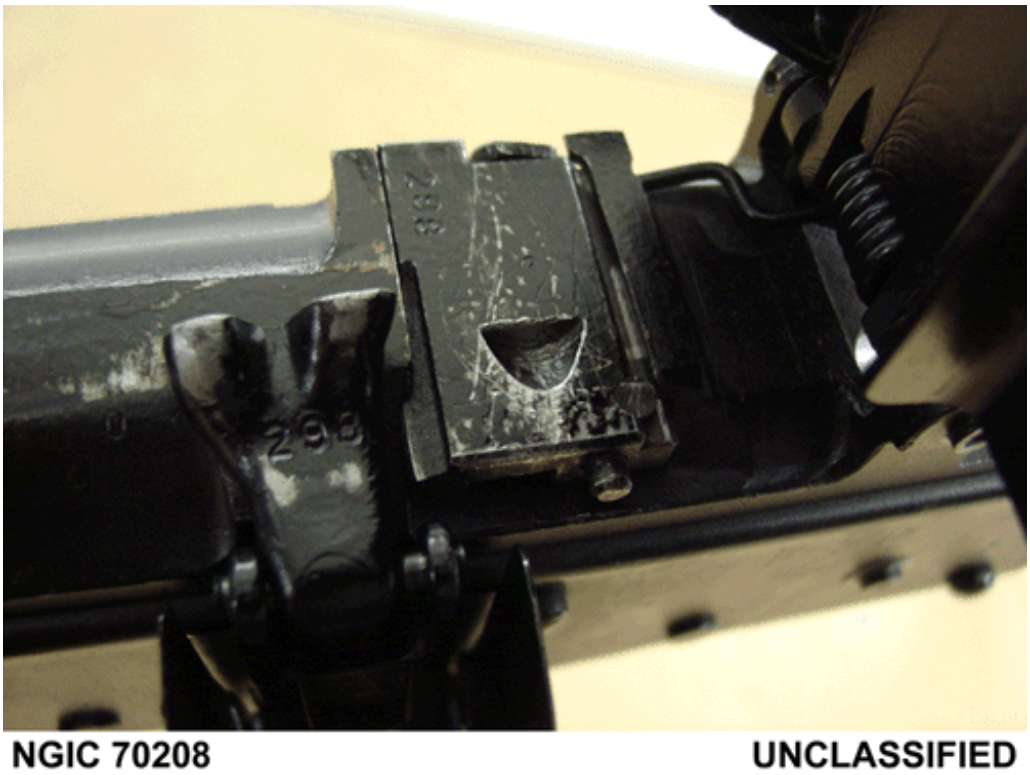

Figure 5-3. Barrel Locking Latch in Closed Position

Replace the Firing Pin in the Bolt: Rotate the bolt with the long groove facing in the upward position. Insert the firing pin while pushing the cylindrical portion of the firing pin forward see figures 5-4 & 5-5).

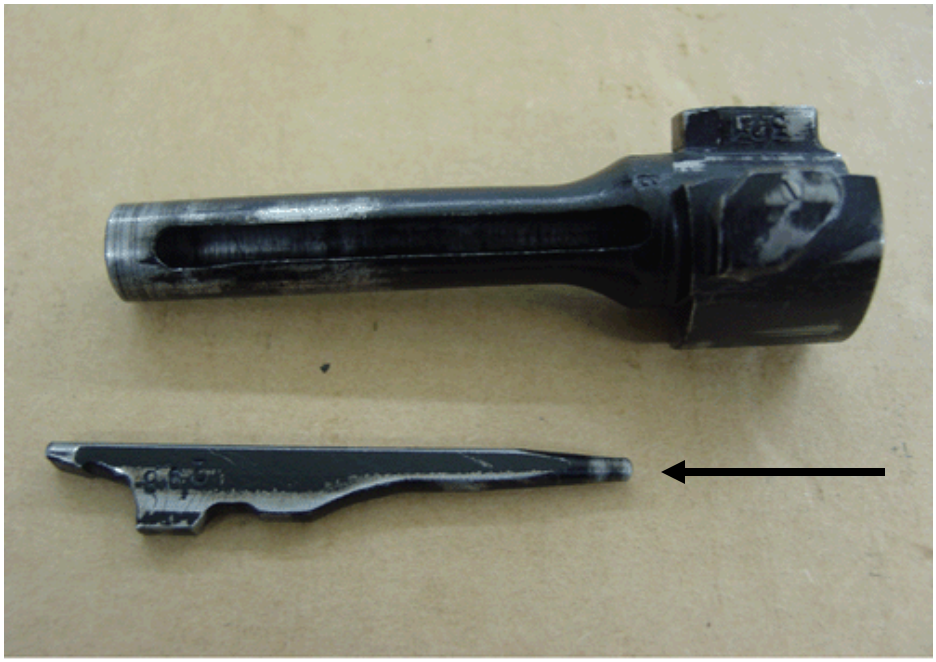

Figure 5-4. Cylindrical Portion of Firing Pin

Figure 5-5. Firing Pin in Forward Position

Replace the Bolt into the Carrier: Align the notch on the firing pin with the groove on the sliding cam. Push the rotating bolt to the rear while turning the rotating bolt in a clockwise motion (see figures 5-6 & 5-7).

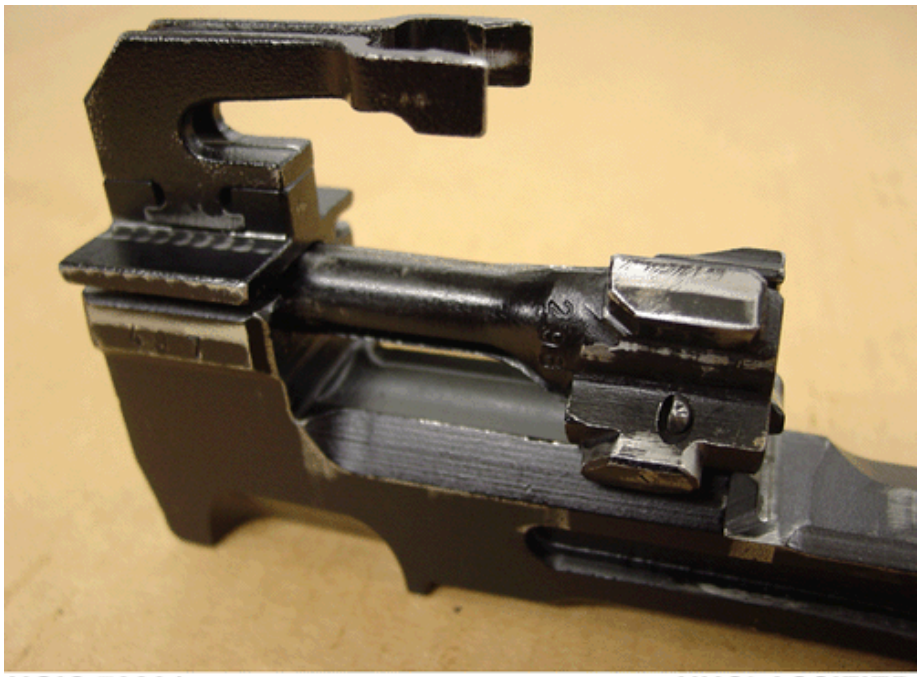

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Figure 5-6. Bolt Inserted, and Groove on Sliding Cam Aligned with Notch on Firing Pin

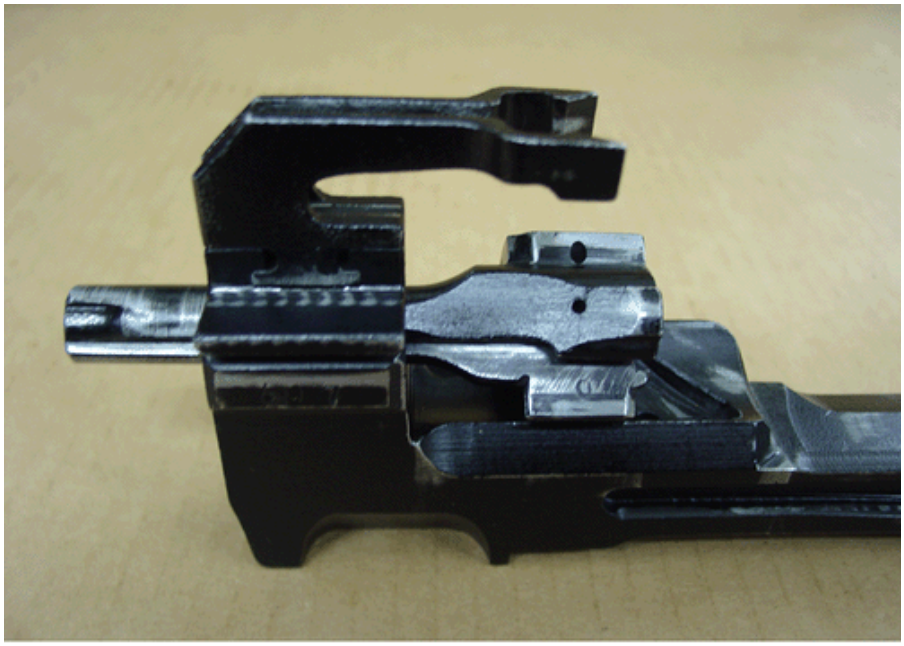

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Figure 5-7. Bolt in Rearward Position of Sliding Cam

Replace the Slide and Piston: Grasp the slide by the cartridge space gripper, aligning the piston into the gas tube cylinder and the notches on the sliding cam with the grooves on the receiver group. Slide the cam and piston forward while depressing the trigger (reason why weapon needs to be assembled with selector lever in fire mode) (see figures 5-8 – 5-10).

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Figure 5-8. Piston Aligned into Receiver Assembly

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Figure 5-9. Sliding Cam Notches Aligned

With Receiver Group Grooves

Figure 5-10. Sliding Cam and Piston in Forward Position

Replace the Operating Rod Assembly: Insert the operating rod assembly into the rear opening of the sliding cam (bolt carrier) and press the assembly forward and down against the spring pressure until the notch at the end of the guide rod is seated in the receiver group (see figures 5-11 5-12).

Figure 5-11. Operating Rod Assembly Aligned and Pushed Forward in Receiver Group

Figure 5-12. Operating Rod Assembly Partially Seated in the Receiver Group

Close the Feed Tray Cover: Grasp the weapon by the buttstock; with free hand close the feed tray cover (see figure 5-13).

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Figure 5-13. Feed Tray Cover Closed

Section VI. Accessories

The PK-series machinegun accessories facilitate the carrying of the machinegun components and ammunition, the loading of machinegun, cleaning, lubrication, disassembly, and assembly. The PK-series machinegun accessories generally consist of the following: five ammunition boxes (three large and two small boxes), 19 link belts (five with tabs and 14 without), the cleaning rod, the carrying case, the sling, the strap for attaching the ammunition boxes to the tripod, two slings for carrying the tripod, the handle and cover, the punch, the cleaner, the cleaning brush, the oil cans, the ruptured cartridge extractor, recoil device and attachment for blank ammunition, the canvas bag for some accessories and for every three machineguns a belt loader.

250-cartridge ammunition box. The larger ammunition box (see figure 6-1) serves the storage and transport of a link belt holding 250 cartridges. The lid is on the top of the box and is fastened on the rear with lugs and a pin. Two brackets are riveted onto the top for fastening the carrying handle. The handle is made of linen and has rivets on the ends which fasten it to the brackets. The image of a cartridge is stamped into the lid, which indicates the direction that the link belt is to be placed into the box. On the front of the lid there is a latch which is attached with lugs and a pin. On the bottom of the latch there is a profiled hole for the latch fastener. It keeps the latch shut and attaches the ammunition box to its bracket on the right rear leg. Two ribs are welded onto the inside of the lid, which fit onto the sides of the box.

100-cartridge ammunition box. The smaller ammunition box (see figure 6-1) serves the storage and transport of a link belt holding 100 cartridges. The lid and latch are fastened to the box with lugs and a pin. On the top of the lid is a shutter through which the link belt passes when the box is fastened to the ammunition box bracket on the receiver of the machinegun. When the shutter is closed, it is held in place by a round projection. In front of the round projection is the ammunition box fastener. It consists of the handle, shaft, pin, machine bolt, tooth and bracket, spring and grab. The fastener fastens the box to the bracket on the receiver of the machinegun. The latch fastener secures the box to the tripod (see figures 6-2 & 6-3).

Figure 6-1. 100- and 250- Cartridge Ammunition Boxes

Figure 6-2. Ammunition Box Release Lever Action

Figure 6-3. Ammunition Box Installation

Ammunition Link Belt. The link belt (see figure 6-4) holds 50 rounds for easy loading of the machinegun when firing. It consists of links which are held together with springs. The end link has a semicircular notched lug so that multiple link belts can be connected. The tab facilitates the feeding of the link belt into the feeding mechanism of the machinegun.

Figure 6-4. Ammunition Belt Links

Carrying Case. The carrying case (see figure 6-5) is made of tarpaulin canvas and holds the machinegun. The handle and sling along with the leather shoulder pads allow the machinegun to be carried in various positions.

Sling. The sling (see figure 6-5) is a cotton strap and facilitates the carrying of the machine when encounters with the enemy are expected. On the top of the sling is a hook and the on the bottom a metal end and a buckle. The shoulder pad is slipped onto the sling so that the machinegun may be carried more comfortably.

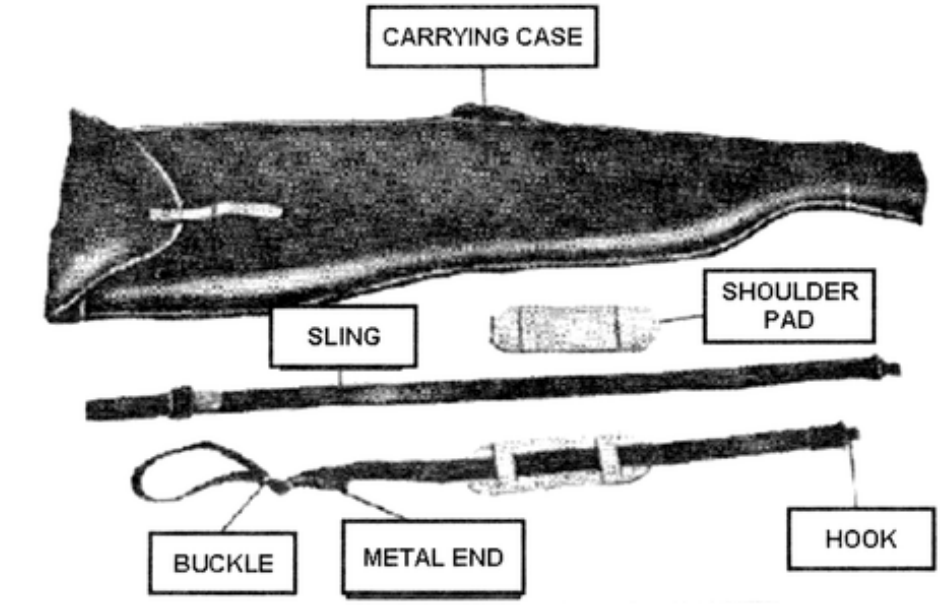

Figure 6-5. Sling & Carrying Case

The strap for attaching ammunition boxes to the tripod. It is made of linen with leather extensions (see figure 6-6). The strap has two carabiners with rings which are fastened to the swivels on the rear legs, as well as two buckles for fastening the leather extensions.

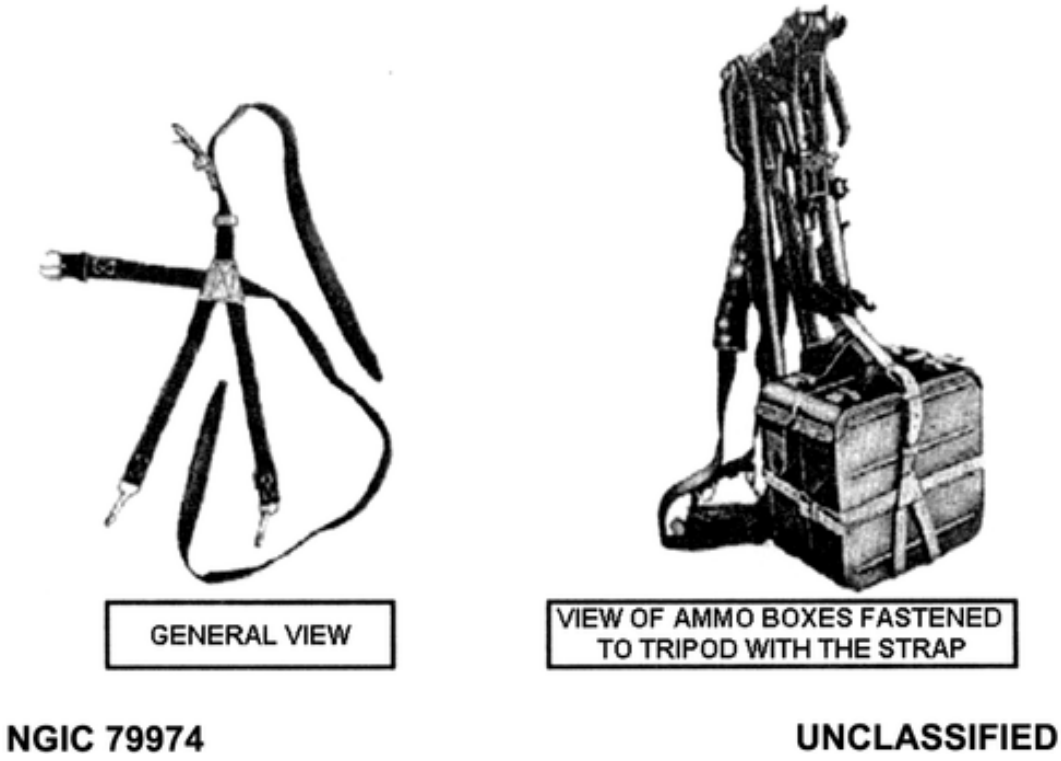

Figure 6-6. Tripod Ammunition Box Straps

The slings for carrying the tripod These are cotton straps and their length is adjustable (see figure 6-7). They are attached to the swivels on the tripod with the carabiners and rings. The straps have shoulder pads for comfortable carrying of the machine gun. The cross-strap and carabiners connects the slings and prevents them from falling off the wearer's shoulders.

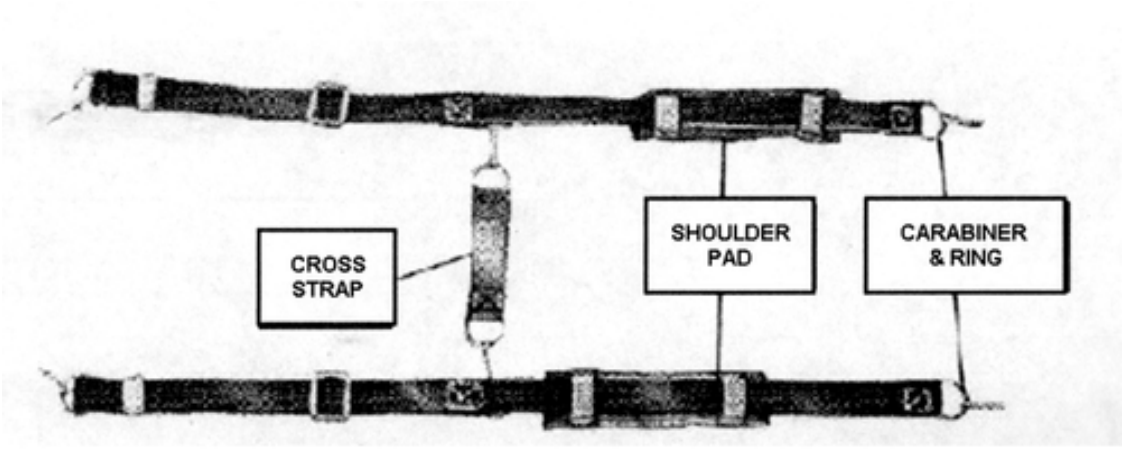

Figure 6-7. Tripod Slings

Cleaning Rod. The cleaning rod (see figure 6-8) consists of three components and is used to clean and lubricate the barrel and to push out stuck cartridge cases from the breech. The rear end of the cleaning rod has a shoulder with a hole which holds the pin punch so that the cleaning rod may be handled more easily during cleaning and lubrication of the barrel. The tip of the front end is threaded for attaching the cleaning brush and patch holder and a slot for holding patches. The components of the cleaning rod screw together.

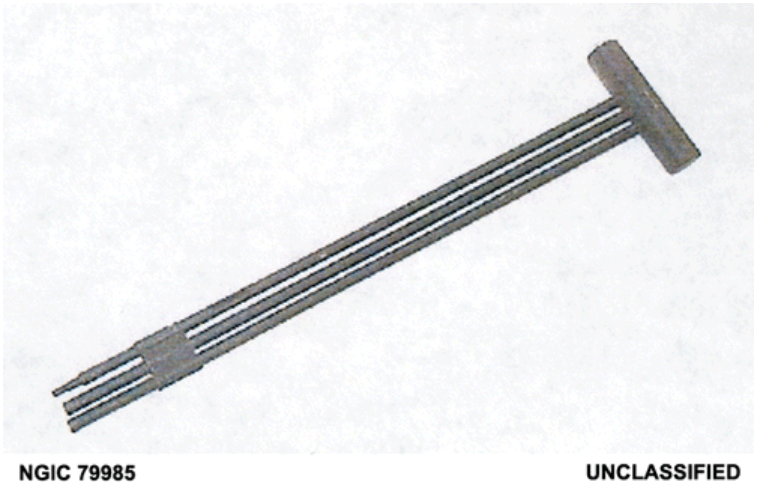

Figure 6-8. Cleaning Rod

Pin Punch. The pin punch (see figure 6-9) is used during disassembly and assembly of the machinegun.

Figure 6-9. Pin Punch

Patch Holder. The patch holder (see figure 6-10) serves to clean the barrel; it screws onto the cleaning rod. Tow or a rag is wrapped around the notched part.

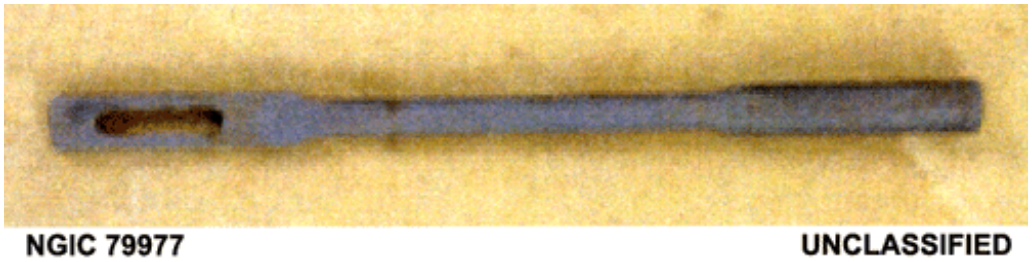

Figure 6-10. Patch Holder

Cleaning Brush. The cleaning brush (see figure 6-11) is used to clean and lubricate the bore of the barrel.

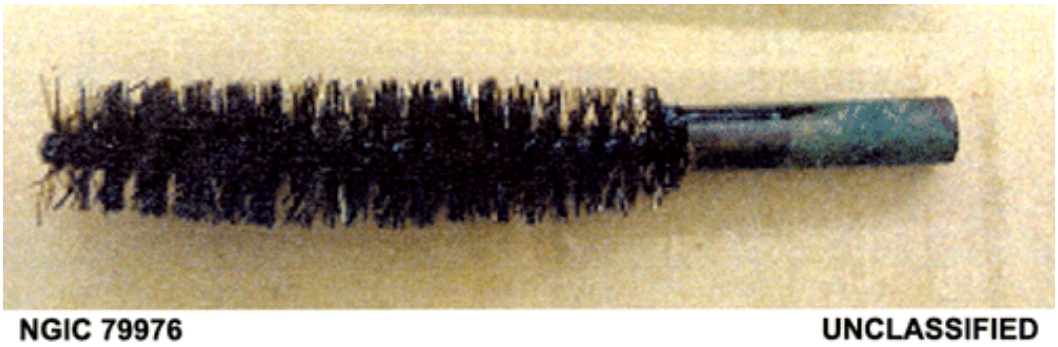

Figure 6-11. Cleaning Brush

Oil Can. The oil can (see figure 6-12) holds 30 cm3 and serves to hold general-purpose protective oil (GPPO) for lubrication.

Figure 6-12. Oil Can

Ruptured Cartridge Extractor. The ruptured cartridge extractor (see figure 6-13) serves to extract a cartridge case whose head and rim have torn away and which has remained in the breech. It consists of the nut, flexible cap, and shaft. The shaft screws into the nut.

Figure 6-13. Ruptured Cartridge Extractor

Recoil Device. The recoil device (see figure 6-14) for blank ammunition allows proper functioning of the machinegun when firing blank ammunition. It screws onto the barrel when the flash suppressor is removed.

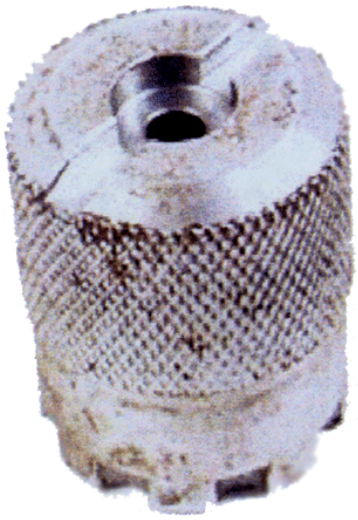

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Figure 6-14. PK Recoil Device

The attachment for blank ammunition serves to ensure proper functioning of the feed mechanism components, slide and piston, and bolt when firing blank ammunition. It fits into the longitudinal grooves on the bottom of the feed plate.

Canvas Bag. The canvas bag serves to hold the handle and lid, oil can, ruptured cartridge extractor, recoil device and blank ammunition attachment, cleaning brush, patch holder, and pin punch.

Link Belt Loader. The link belt loader (see figure 6-15) serves to feed cartridges into the link belt. It consists of the loading mechanism, handle, and clamp.

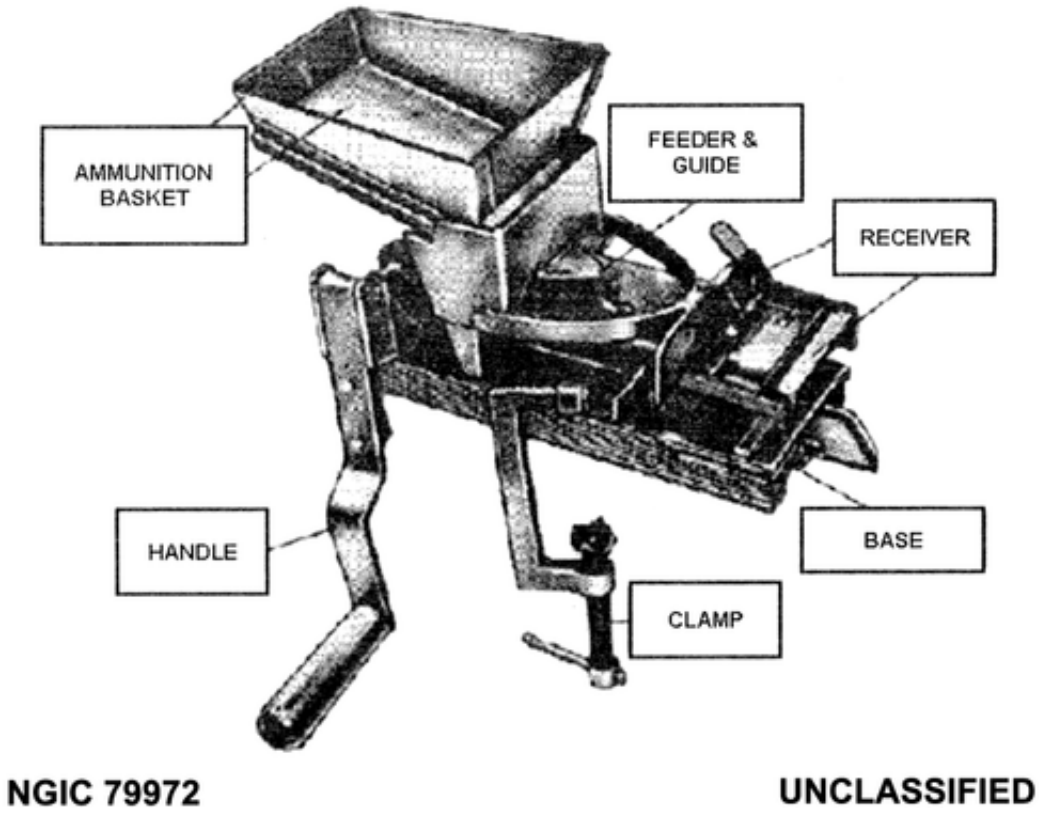

Figure 6-15. Link Belt Loader

The link belt loader is packed, carried, and stored in its original wooden box. It is taken from the wooden box and clamped to a table or inserted into the guide on the side of the box.

In order to prepare the link belt loader for use, it is necessary to do the following:

1) Remove the loader parts from the box.
2) Fasten the handle with the locking device.
3) Set up the base and fasten it to a table or to the side of the loader.
4) Set up the link belt feed.
5) Fill the basket with cartridges so that they lie across the width of the basket.
6) Lift the lid of the receptacle and insert the link belt with the cutouts on the links facing downward.
7) Insert a cartridge into the first link by hand and place the link belt with the cartridge opposite the feed; close the receptacle lid (see figure 6-16).

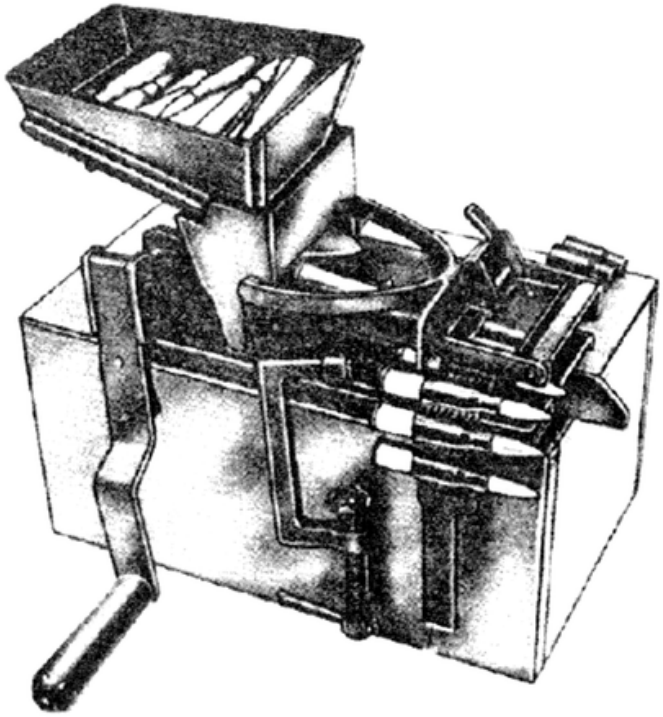

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Figure 6-16. Link Belt Loader Prepared for Use

In order to load the link belt with cartridges turn the handle clockwise with your right hand at an even speed and add ammunition to the basket with your left hand so that it lies across the width of the basket. When loading the link belt, attention must be paid that the link belt does not twist. During loading, the cartridges fall by their own weight into the narrow part of the conduit where the feed mechanism takes hold of them and pushes them out of the chute. The cartridge is passed forward along the conduit and then falls onto the bottom from where the feed mechanism aligns it with the link when the handle is turned around again. When the feeder returns to the rear position, its lever moves the link belt feeder which presses it into the link belt and moves it by one link.

In order to pack the link belt loader into the wooden box, it is necessary to do the following:

1) Release the latch and move the handle along the length of the loader over the feed mechanism.
2) Raise the clamp and fasten it with the machine bolt.
3) Place the handle between the bifurcation and the clamp machine bolt and place the components in the wooden box.

Section VII. Maintenance

Periodically and after all firing, the PK machinegun must be cleaned and inspected. Proper maintenance can be accomplished after disassembling the weapon into its major groups as indicated in Section IV.

The PK machinegun should be cleaned:

1) Prior to firing.
2) After firing.
   - Immediately after firing and on two consecutive days thereafter, thoroughly clean the bore, chamber, and the metal parts that have become fouled with powder, carbon, or with bore cleaner (cleaning compound, solvent, CR). Do not wipe dry. On third day after firing, clean with bore cleaner, wipe dry, and oil.
   - Clean the rest of the metal parts on the weapon with dry cleaning solvent (SD) immediately after firing. Wipe dry and oil.
   - Do not clean the inside of the gas system unless blank ammunition has been fired, or unless the gun fires sluggishly.
3) During any combat situations or in extended field exercises; daily during noncombat action periods.
4) No less than once a week if the weapon is not used. Clean the bore and the chamber with bore cleaner, wipe dry, and oil. Clean the rest of the metal parts on the weapon with dry cleaning solvent (SD). Wipe dry and oil. Clean oil only on well cleaned and dry metal surfaces immediately after cleaning so that moisture is not allowed to form on the metal.

Listed below are the established “Basic Maintenance” procedures as outlined in the Yugoslavian (U) Manual for the M84, 7.62-mm Machinegun, dated 1989.

Basic maintenance serves the purpose of ensuring at all times the proper functioning of the machinegun and the ammunition that is being used or stored in ammunition depots. Basic maintenance of the machinegun includes daily inspections, servicing, and periodic (weekly) inspections.

Daily Individual Weapon Inspection: Daily inspections are designed to ensure the proper functioning of the machinegun and its completeness. They are carried out by the squad commander and members of the crew. Daily inspections include inspections prior to, during, and after the use of the weapon. Inspections prior to and during use are carried out with the machinegun assembled; in order to conduct inspections after use, the machinegun is disassembled and cleaned.

1) Inspection of the assembled machinegun.

Inspection of the assembled machinegun is supposed to establish the following:

- Whether the machine gun is empty.

- The presence of corrosion, scratches, and dents on metal parts or cracks on the gun stock.
- The proper functioning of mechanical sights (whether the sight leaf folds over and the elevation knob rotates easily).
- Whether the optical sight is securely fastened, whether the rubber eye shield and the cover are properly adjusted and in good working order, and whether the cover is fastened with a string.
- Whether the cover pin securely fastens the cover.
- Whether the entry and exit shutters close the openings for the passage of the link belt and whether the springs are working properly.
- Whether the gas regulator is in the desired position.
- Whether the bipod folds and locks in position easily.
- Whether the flash suppressor is properly screwed on the barrel and fastened with a pin.
- Whether the machinegun is properly positioned and fastened on the tripod.
- Whether the machinegun can be easily moved for windage and elevation and locked in a specific position.
- Whether the mechanism for precision adjustment of the machinegun for elevation functions properly.
- Whether the ammunition box is properly fastened on the ammunition box bracket.
- Whether the machinegun and the optical sight accessories are complete and in good working order.

After this, in order to check the good working order and proper functioning of machinegun component and the ordnance as a whole, the following must be done: Open the cover and check that the feed assembly components (feed plate, feed pawl, guard, and cartridge retainer pawl) are not damaged or broken; open the ammunition box cover and position the link belt filled with training rounds in the feed plate; close the cover and pull the slide with the bolt rearward before returning the cocking lever forward; pull the trigger; open the cover and remove the link belt from the feed plate; pull the slide with the bolt rearward and eject the round through the cartridge ejection port, then, while holding the cocking lever with your fingers, return the slide in the forward position.

2) Inspection of the disassembled machinegun

Inspection of a disassembled machinegun is intended to check the proper working order of individual components, such as:

- **Barrel assembly:** That there are no dents, scratches, or dirt on the outside; that there are no cracks on the handle and that the tooth of the handle is not worn or broken; that the handle can be moved longitudinally and vertically; whether the flash suppressor screws onto the barrel easily and can be fastened with the pin; that there is no powder fouling, dirt, corrosion, scratches in the interior of the barrel, and that there are no bulges in the barrel.

- **Receiver assembly and grip:** That they are free of dents, scratches, corrosion, or dirt; that the cartridge ejector is not worn or broken; that cocking lever slides easily and its tooth is neither worn nor broken and that the spring and shaft of the lever are operating properly; that there is no corrosion or dirt and no scratches on the barrel lock and that the lock is equipped with the machine bolt, the plug and the pin; whether the shutters on the opening for cartridge ejection function properly, whether the grip is properly fastened with the machine bolt and not cracked.
- **Receiver cover and feed mechanism assembly:** That they are free of dents, scratches, dirt, and corrosion; that the cover latch is in good working order and the tooth not worn or broken; that the spring holds the cover in the upright position; that the (entry and exit) shutter springs press the shutters towards the cover; that the traversal stop is not broken; that the cover lever is not broken and that the spring constantly pushes it downward; that there are no scratches, corrosion, dirt on the feed plate and that the latch holds the feed plate in the upright position; that the feed pawl assembly components are not broken or damaged, and that the cartridge retainer pawl is not damaged or broken.
- **Trigger mechanism:** That there is no dirt, corrosion, nor scratches on the trigger mechanism components; that the sear spring is not broken and the sear tooth is neither damaged nor worn; that the trigger tooth catches the sear tooth and pulls the sear downward; and that the safety in the “safe” position prevents the trigger from being pulled rearward.
- **Gun stock assembly:** That the stock fits well next to the receiver and has no cracks; that the sling swivel is properly and securely fastened; that the shoulder rest spring holds the shoulder rest in an extended or folded position.
- **Mechanical sight:** That the sight blade guard is not deformed; that the notches on the blade housing and the sight base are aligned; that the springs of the rear sight leaf and elevation knob are working properly; that there are no dents or scratches on the leaf that could impede the proper functioning of the elevation knob; that the leaf is not bent and that there are no scratches or dents on the sight notch that could interfere with proper sighting.
- **Gas block and gas regulator:** That the opening on the gas block and the openings on the gas regulator are not blocked and that there is no corrosion, dirt, or powder fouling on them; that arms of the gas regulator are not broken or deformed; whether the many markings of the gas regulator position are visible; and that the profiled lug of the gas regulator is not damaged, dirty, or corroded.
- **Gas cylinder assembly:** That the opening inside the gas cylinder is not blocked and that there is no corrosion, dirt, or powder fouling; that the cylinder fits easily onto the gas block rim, and that there are no scratches, dirt, or corrosion on the spring latch.
- **Operating rod assembly:** That there is no corrosion, dirt, or powder fouling on individual components; whether the operating rod spring is functioning properly; and whether the support plate and guide rod are not broken or deformed.
- **Slide and piston assembly:** That there is no corrosion, dirt, no scratches or powder fouling on the individual components; that the protrusion on which the

cocking level tooth catches is not worn; and that the claws of the bullet extractor are not broken or deformed, and that the teeth on them are not worn.

- **Bolt assembly:** That there are no dents, scratches, corrosion, and dirt on the grooves, protrusions, and openings, that the bolt face is not worn or damaged; that the extractor claw is not damaged and whether the spring holds are properly in the housing, and whether the tip of the firing pin is not broken.
- **Bipod assembly:** That there is no corrosion, dirt, dents, or scratches on the individual components; whether the bipod mounting bracket easily moves inside the gas cylinder groove; whether the coupling limits the bipod from extending sideways; whether the latch fastens the bipod in a folded position; and whether the cleaning rod fastener functions properly.
- **Tripod assembly:** That there is no dirt and corrosion, and no scratches, dents, and deformed (bent) or broken components; whether the nuts on the cradle mount shafts are screwed on tight and fastened with a cotter pin; that the tooth, the lever or the spring of the latch on the machinegun trigger guard are not broken or damaged; whether the mechanism for precision adjustment of the machinegun for elevation moves the cradle vertically; that there are no scratches or dents on the components of the attachment for firing targets in the air, whether the large coupling slides easily along the support, and the small one can be easily fitted onto the pintle and fastened with a latch; whether the windage mechanism latch fastens the machinegun cradle in the designated position; that there are no broken teeth on the serrated arc and that the spring stops are not broken or deformed; and whether the bipod latches securely lock the bipod in the designated position.
- **Machinegun accessories:** That there is no dirt or corrosion on them; that the linen and leather components are not damaged or torn; whether the ammunition boxes can be shut easily and fastened on the rear right leg of the tripod; that the link belts are clean and that there are no deformed links; by installing the link belt loader, check whether it properly feeds the rounds into the link belt and establish whether the cleaning rod, ruptured cartridge extractor, and the attachment for blank ammunition are working properly.

Weekly Individual Weapon Inspection: Periodic (weekly) inspections form an integral part of the training and education of units and installations and must be planned within the work schedule. In principle, inspections of all equipment and materiel currently in use within the parent unit or installation are carried out once a week.

During the periodic inspection the technical status and completeness of the machinegun are checked as is the up-to-date status of the weapon logbook. At the same time, the crew's knowledge of the ordnance and their ability to maintain it is checked. At the request of a senior officer from the parent unit, expert personnel from the technical maintenance units can be assigned to carry out expert procedures during the periodic inspection.

Lubrication

Lubricate the weapon with lubricating oil and keep it covered as much as possible.

Hot & Humid Weather: Inspect the weapon more frequently for signs of rust. Keep the weapon free of moisture and lightly oiled with lubricating oil. Clean and oil more frequently if the weapon is exposed to salt air, high humidity, or water.

Hot & Dry Weather: Clean the weapon frequently to keep sand and dust from collecting on the working parts; use of weapon oil should be kept to the absolute minimum. Graphite is best in hot and dry climates.

Cold Weather: During cold weather periods with a temperature of 5 degrees Celsius and below, lubricate the machinegun only with liquid weapon oil. When changing from one lubricant to another, it is necessary to carefully remove the old lubricant from all parts of the weapon.

Before removing the old lubricant, it is necessary to conduct full disassembly of the machinegun, wash all metal parts in liquid weapon oil and then rub them clean with a rag. Note: Never use weapons grease instead of liquid weapon oil with air temperatures below 5 degrees Celsius.

A machinegun carried from a freezing to a warm location is to be cleaned after 1-20 minutes (after it becomes moist). It is recommended that the machinegun be rubbed off with a rag wetted with liquid weapon oil before entry into a warm place.

Listed in table 7-1 are the established “Stoppages During Firing and Corrective Actions” procedures as outlined in the Yugoslavian (U) Manual for the M84, 7.62-mm Machinegun, dated 1989.

When handled, maintained, and stored properly, the machinegun is a safe weapon to use and functions without interruption.

After prolonged operation, owing to the wear or breakage of individual components, presence of dirt, use of faulty ammunition, or negligent handling, defects may appear that cause stoppage. In order to prevent stoppage, soldiers and officers must strictly observe the rules on handling, disassembly, cleaning, assembly, and inspection of weapons; prior to firing inspect the ammunition belt and ammunition; the machinegun should not be loaded with faulty or dirty ammunition; prior to loading, wipe the ammunition with a dry rag; during firing, while running or pausing in combat, take good care of the weapon; inspect, clean and lubricate the machinegun regularly, especially its movable components, the bore, the gas block, the gas regulator, the gas cylinder, the receiver, the feed mechanism and ammunition belt; prior to firing regularly clean the barrel and lightly lubricate the receiver and the bolt assembly; during uninterrupted firing do not exceed the limit of 250 rounds. If stoppage occurs, wait up to 5 seconds, pull the bolt rearward, eject the stuck round, and continue to fire. If stoppage reoccurs, empty the machinegun, establish the cause of stoppage, and clear it if possible. If stoppage cannot be cleared, send the machinegun for repair.

Table 7-1. Machinegun Troubleshooting

Malfunctions and their Characteristics	Reasons for Malfunctions	Corrective Action
Bolt fails to move to rear and extract cartridge from belt link; cartridge jams under bolt head.	• Improper feeding, the 1st cartridge did not reach cartridge stop. • Wpn is on Safe.	• Disengage safety and pull back charging handle. • Press receiver cover latch and open receiver cover. • If cover does not open, use tools to feed the first round properly.
Bolt fails to move to rear and push the cartridge out of the feed. The cartridge jams between the bolt and the barrel or its tip hits against the breech.	• Broken or weak driving spring, lubricant build-up or dirt in receiver assembly. • Worn bolt face.	• Pull bolt rearward and release it suddenly. • Clear machinegun of ammunition. • Clean receiver and bolt. • If driving spring is broken, weak or the bolt face is worn, send wpn to the armorer for repair.

Malfunctions and their Characteristics	Reasons for Malfunctions	Corrective Action
Bolt fails to lock.	• Dirty receiver, chamber, gas port, or cartridges. • Bent cartridges. • Belt links with cartridges jammed in the feed tray.	• Remove barrel and lightly lubricate the chamber, gas port, and receiver surfaces that rub against each other. • Replace faulty cartridge or link belt.
Failure to fire.	• Faulty cartridge. • Faulty firing pin. • Dirty weapon.	• Eject cartridge from the wpn. If there is a weak indent from the firing pin, remove the bolt, clean and lightly lubricate. • Clean and lightly lubricate the chamber. • If the firing pin is broken, send the wpn to the armorer for repair.
Cartridge case does not eject.	• Faulty extractor or spring. • Dirty chamber. • Cartridge case rim torn off. • Dirty gas port or cylinder. • Faulty shutter lever.	• Eject the stuck cartridge case using cleaning rod; clean and lubricate chamber, gas port, gas cylinder, and receiver. • If rim of cartridge case tears off again, turn the gas regulator to a lower position. • If malfunction is due to faulty extractor, send wpn to the armorer for repair.
Ruptured cartridge case; next cartridge does not fit into the chamber	• Large headspace between the breech and the bolt face • Faulty cartridge.	• Charge the wpn, and if it ejects the front part of the cartridge case of the fired cartridge, continue to fire. • If same stoppage reoccurs, have the headspace adjusted (at repair facility).

Malfunctions and their Characteristics	Reasons for Malfunctions	Corrective Action
Cartridge case does not eject from the receiver.	• Dirty receiver surface, gas port, gas cylinder, or block.	• Eject the cartridge case and continue firing. • If same stoppage reoccurs, clean and lubricate the receiver, gas port, and extractor.
Cartridge fails to extract from the belt or falls out of extractor claws	• Faulty cartridge extractor claws. • Dirty or faulty feed pawl or cartridge retainer pawl. • Bent belt links or cartridges.	• If cartridge extractor and feed mechanism components are functioning properly and belt and ammo is free of defects, clean the wpn and continue firing. • If wpn components are defective, send wpn to the armorer for repair.
Cartridge case does not eject.	• Faulty extractor or spring. • Dirty chamber. • Cartridge case rim torn off. • Dirty gas port or cylinder. • Faulty shutter lever.	• Eject the stuck cartridge case using cleaning rod; clean and lubricate chamber, gas port, gas cylinder, and receiver. • If rim of cartridge case tears off again, turn the gas regulator to a lower position. • If malfunction is due to faulty extractor, send the wpn to the armorer for repair.
Ruptured cartridge case; next cartridge does not fit into the chamber	• Large headspace between the breech and the bolt face • Faulty cartridge.	• Charge the wpn, and if it ejects the front part of the cartridge case of the fired cartridge, continue to fire. • If same stoppage reoccurs, have the headspace adjusted (at repair facility).

Malfunctions and their Characteristics	Reasons for Malfunctions	Corrective Action
Slide does not return to the rear position.	• Dirty receiver, feed mechanism, link belt, or ammunition. • Link belt stuck in the ammunition box or twisted in the feed mechanism.	• Pull back on charging handle so that the slide is back to the sear tooth and continue firing. • If the stoppage reoccurs, disassemble the wpn; check how the ammunition is packed in the box and whether the link belt is properly loaded. • If the belt is properly loaded, turn the gas regulator to a higher position. • At the earliest possibility clean and lubricate the machinegun.
Uncontrolled fire/runaway machinegun.	• Faulty trigger mechanism. • Worn notched lug at the bottom of the slide. • Lubricant buildup or presence of dirt inside the machinegun.	• Interrupt fire by pressing the belt towards the feed mechanism with your hand. • Clear the wpn; inspect the sear and the notched lug on the frame of the slide. If they are free of defects, switch gas regulator to a higher position and lubricate the interlocking parts.

Section VIII. Service and Training Ammunition

The PK series of machinegun fires the 7.62 x 54R-mm, M1908 cartridge (see figures 8-1 & 8-2). The M1908 cartridge also goes by the following nicknames: 7.62-mm Mosin Nagant; 7.62 x 53R; 7.62-mm Soviet rimmed; 7.62-mm M1908, 7.62-mm M1891, 7.62-mm Russian Rimmed, 7.62-mm Russian Long, 7.62-mm Type 53, and the 7.62-mm Type 59.

Note: The M1908 cartridge is a spitzer-profiled bullet version of the M1891 cartridge; the M1891 cartridge had the old-style, rounded-nose bullet. The cartridges have varying construction depending upon their purpose. The weight of the bullets and their muzzle velocity are selected so that firing with the different bullets can be conducted with the same sight settings. Ammunition is divided into service and training types.

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Figure 8-1. M1908 7.62 x 54R-mm Cartridge and Bullet Profile

Figure 8-2. 7.62 x 51-mm NATO (Left) and
7.62 x 54R-mm (Right) Comparison

Ammunition Characteristics.
The M1908 7.62 x 54R-mm cartridge is a rimmed, bottlenecked cartridge case and is Berdan or Boxer primed. Cartridge cases may be made of brass, copper or brass washed steel, or lacquered steel. Bullet weights will vary from approximately 9 to 12 grams, depending on the type. Approximate muzzle velocity is 840-m/s; however, it will vary, depending on the type of weapon and the length of the barrel from which it is fired. The maximum effective range of this cartridge is about 350 meters when fired from an infantry rifle and approximately 1000 to 1200 meters when fired from a machinegun; this will also vary depending on the specific type of bullet. Listed below are the cartridge case and bullet dimensions for the 7.62 x 54R mm:

- Case length: 53.6 mm.
- Rim diameter: 14.2 mm.
- Bullet diameter: 7.9 mm.

M1908 7.62 x 54R-mm Ammunition Bullet Tip Color Coding.

The M1908 7.62 x 54R-mm cartridge is manufactured worldwide (Russia and the CIS, many Eastern European countries, some Middle Eastern countries, and some Asian countries). Most countries that manufacture 7.62 x 54R-mm cartridges follow the Russian and CIS pattern of bullet-tip color coding (see table 8-1). Some 7.62 x 54R-mm ammunition will also have a red annulus (see figure 8-3). Annulus is a term used to describe the water-proof sealant at both the cartridge case mouth and around the primer which prevents moisture penetration into the cartridge case and fouling the powder.

Table 8-1. Russia & CIS 7.62 x 54R-mm Bullet Tip Color Coding Pattern

Type	Designation	Bullet Tip Color	Bullet Status
Subsonic	Unknown	Cartridge & bullet green	Obsolete
Ball	L	Unpainted	Current
Sniper ball	7N1	Unpainted	Current
Light ball	LPS	Silver	Current
Heavy ball	D	Yellow	Current
Tracer	M1930 Type T	Green	Obsolete
Tracer	Type T-46	Green	Current
AP	B-30	Black	Obsolete
API	B-32	Black; may have red ring	Current
API	BS-40	Red bullet/black tip	Obsolete
API-T	PZ	Purple/red	Obsolete
API-T	BZT	Purple/red	Current
AP-T	BT	Purple	Current
LVI-T	ZP	Red	Current
Blank	Training	Crimped; may have colored sealer	Current

Subsonic: Low velocity ball; for silenced weapons (muzzle velocity below 300 m/s)
Light ball: Light ball bullet (with mild steel core)
Heavy ball: Heavy ball bullet (with lead core)
AP: Armor piercing
API: Armor piercing incendiary
API-T: Armor piercing incendiary tracer
AP-T: Armor piercing tracer
LVI-T: Incendiary ranging

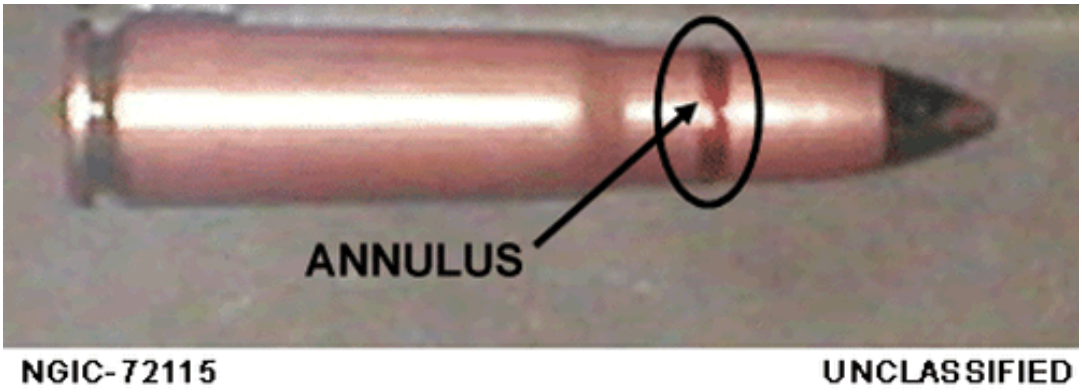

Figure 8-3. Annulus on Russian Federation Cartridges

The rise in international competition for small arms weapons and ammunition sales beginning in the early 1990s has resulted in many companies and countries producing weapons of varying calibers and ammunition in order to make their products more marketable. Some M1908 7.62 x 54R-mm ammunition may be marked in accordance with the International Standard if it was produced and marketed for international sales. The International Standard Color Code (see figure 8-3) was based on the contemporary U.S. color code system.

Table 8-2. International Bullet Tip Color Coding Pattern

Type	Bullet Tip Color Code
Ball	None
Frangible ball	Green tip over white ring
Heavy ball	Green tip
Armor-piercing (AP)	Black tip
Rifle grenade blank round	Rose or red color tip, crimped
Tracer	Orange tip (new); red tip (old)
Dummy round	No color, hole in cartridge case
Blank	No bullet or color, usually crimped
Inert	Entire round is black
Incendiary	Blue or dark blue/light blue tip
Armor-piercing incendiary (API)	Silver or white tip
Armor-piercing incendiary tracer (API-T)	Red tip over silver or white ring
Observation	Yellow tip
Observation tracer	Yellow tip over red ring

M1908 7.62 x 54R-mm Ammunition Headstamps.

The stamped markings that appear on a cartridge case base are termed the headstamp. The only general statement that can be made regarding cartridge headstamps is that the range of data that they can present is extremely varied. At a minimum, military cartridge headstamps normally identify the producer and the year of production. Either or both of these elements may consist of an abbreviation, a letter code, a numeric code, or an arbitrary symbol that is significant only to the producer. The term "producer" is to be interpreted broadly; it may identify the plant that produced the ammunition, or it may identify the country by which (or for which) the ammunition was made, with a separate mark to identify the factory. Other markings may identify the month, quarter, or lot number of production; cartridge caliber; cartridge case material or case construction; or functional bullet type. Marks that appear to serve merely design or decorative purposes, such as stars, dots, or arcs, frequently have a specific meaning for the producer or the intended user.

The term "design element" indicates bits of information that may be found together in a headstamp. If only one element, such as "7.62-mm" is present, this is termed a single-element headstamp; if two elements, such as "7.62-mm" and "3-94" are present, this is termed a two-element headstamp, and so on.

The location of the design elements can be indicated in either of two ways, depending on which is most convenient for the cartridge case at hand: either by its clock-face orientation, in which 12 o'clock is at the top, 3 o'clock is to the right, and so on, or by the angular orientation. For example, a two-element headstamp with one element at 12 o'clock and the other at 6 o'clock or on at 3 o'clock and the other at 9 o'clock would be termed a 2 x 180 pattern; if three elements were distributed equidistantly, it would be termed a 3 x 120 pattern (see figures 8-4 – 8-12).

Some headstamp designs include one or two segment lines that divide the cartridge base into either two or four equal parts or fields in which marking may or may not appear. Segment lines are a design feature that was relatively popular in Europe up to the 1920s, but has since gradually gone out of use; very few producers still follow this practice.

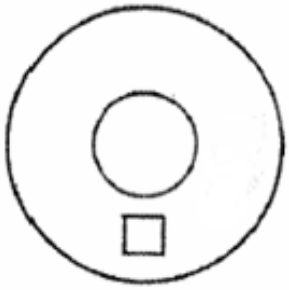

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Figure 8-4. Single-Element Headstamp

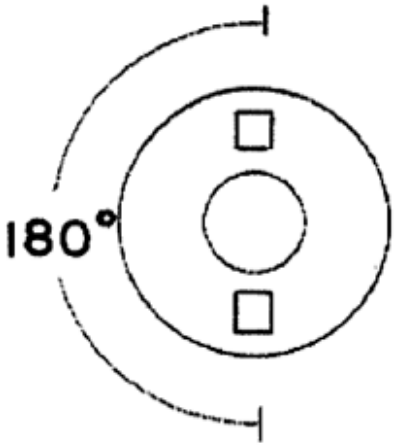

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Figure 8-5. Two-Element, 2 x 180 Headstamp

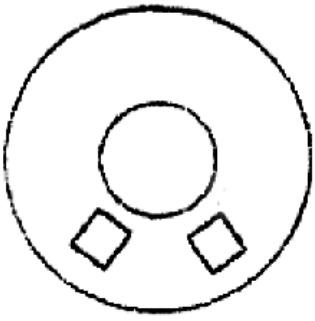

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Figure 8-6. Two-Element, Side-by-Side Headstamp

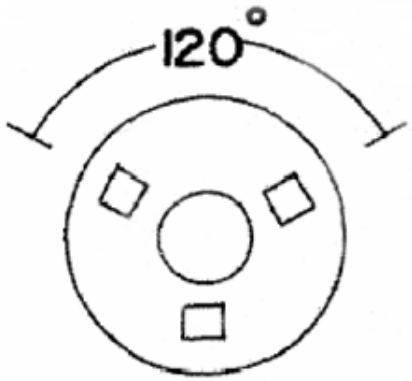

Figure 8-7. Three-Element, 3 x 120 Headstamp

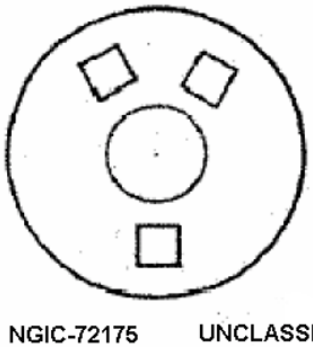

Figure 8-8. Three-Element, Side-by-Side Plus 2 x 180 Headstamp

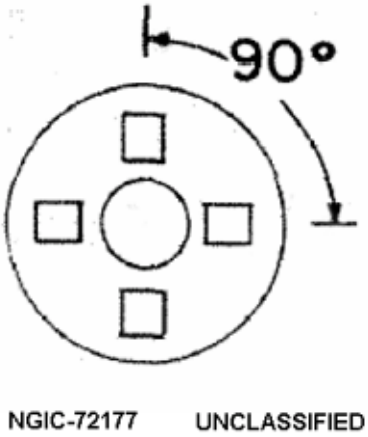

Figure 8-9. Four-Element Headstamp

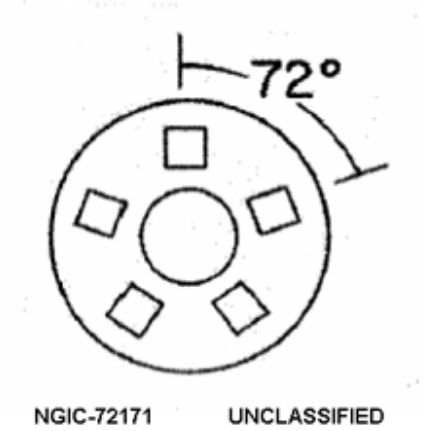

Figure 8-10. Five-Element Headstamp

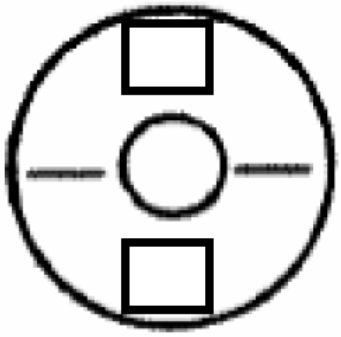

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Figure 8-11. Single Segment Headstamp

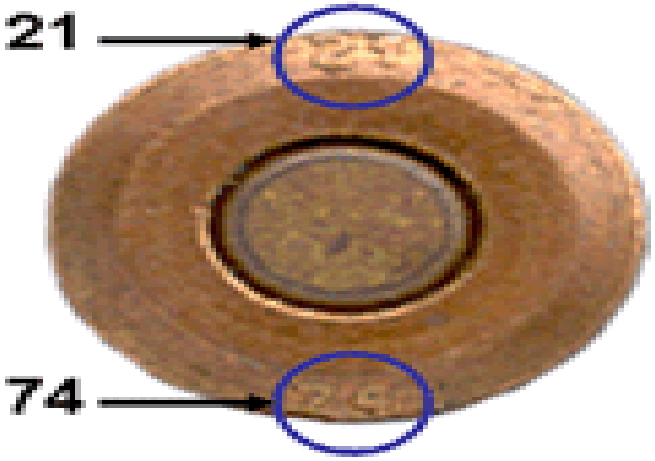

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Figure 8-12. Digital Photo of Two-Element, 2 x 180 Headstamp

The standard method of headstamping M1908 7.62 x 54R-mm ammunition is to mark it with the year of manufacture and with a factory identification mark. The factory identification mark is located on the top of the headstamp, while the year of manufacture is located on the bottom of the headstamp. Headstamp factory codes, dates, and cyphers are stamped and not raised. As stated above, some ammunition may have cyphers, in addition to the year of manufacture and factory identification mark, such as a star ★ triangle ▲ etc. Many headstamp variations exist. At least one nation (Yugoslavia) has combined the factory code and manufacturing year on the top headstamp and placed the caliber (7.62) on the bottom headstamp. Some ammunition can be found with either a headstamp entirely omitted or a partial headstamp with no year of manufacture or factory identification mark.

The year of manufacture normally appears as the last two digits of the year in which it was manufactured, i.e., 1966=66. There are a few notable exceptions to this general rule. For example, Yugoslav ammunition has the full four digits. The Soviet Union used Cyrillic letters in place of the date for about 5 years. See below. Some, though not all, North Korean ammunition uses a Korean letter or a hieroglyphic in place of a date.

USSR Cyrillic Letter Date Code:

r–1952	A (Cyrillic A)–1953
E–1954	N (Cyrillic inverted N)–1955
K–1956	

The standard factory identification mark used by most nations for M1908 7.62 x 54R-mm ammunition is a number code; however, there are exceptions. There are some factory codes that are used by more than one country.

- For example, Code 21 is used by both Hungary and Poland. Hungarian ammunition has both the factory code and date both upright while Poland has the date inverted.
- Code 10 was used by the USSR prior to 1946, is still used by Bulgaria, and during the 1970s a new Code 10 appeared whose origin is unknown.
- Beginning in the 1970s a large number of Chinese factory codes appeared, mostly with three and four digits. It is unlikely that these new high number codes represent new factories, but current factories allocated one or more additional factory codes to produce in an attempt to cause confusion outside China or to specify the type within a factory. The original factories in commission prior to 1970 were factories 11, 31, 41, 51, 61, and 81; not all produced 7.62x54R mm. It is also possible that a factory 21 also existed.

- Listed below in table 8-3 are the typical styles of Factory Code Letters that may be found.

Table 8-3. Typical Small Arms Ammunition Factory Code Letters

Code	Country	Code	Country	Code	Country
3	Albania	10	Bulgaria	1	China / PRC
031	China / PRC	0501	China / PRC	31	China / PRC
41	China / PRC	51	China / PRC	61	China / PRC
71	China / PRC	81	China / PRC	95	China / PRC
101	China / PRC	111	China / PRC	121	China / PRC
131	China / PRC	141	China / PRC	151	China / PRC
171	China / PRC	179	China / PRC	201	China / PRC
211	China / PRC	221	China / PRC	301	China / PRC
311	China / PRC	321	China / PRC	324	China / PRC
325	China / PRC	331	China / PRC	341	China / PRC
351	China / PRC	371	China / PRC	391	China / PRC
451	China / PRC	501	China / PRC	521	China / PRC
561	China / PRC	601	China / PRC	621	China / PRC
631	China / PRC	641	China / PRC	651	China / PRC
661	China / PRC	671	China / PRC	710	China / PRC
791	China / PRC	811	China / PRC	821	China / PRC
881	China / PRC	911	China / PRC	921	China / PRC
944	China / PRC	946	China / PRC	947	China / PRC
948	China / PRC	964	China / PRC	6141	China / PRC
6201	China / PRC	6202	China / PRC	6203	China / PRC
9121	China / PRC	9141	China / PRC	9381	China / PRC
9531	China / PRC	9611	China / PRC	9631	China / PRC
9661	China / PRC	9671	China / PRC	9901	China / PRC
21215	China / PRC	13	Cuba	PMV	Cuba
ZV	Czechoslovakia	aym	Czechoslovakia	bxn	Czechoslovakia
0	Czech Republic	7	Czech Republic	01	East Germany
04	East Germany	5	East Germany	05	East Germany
06	East Germany	22	East Germany	21	Hungary
23	Hungary	25	Hungary	93	North Korea
93 △ o	North Korea	21	Poland	234	Poland
		54	Poland	343	Poland
361	Poland	15	Romania	RPR 21	Romania
RPR 22	Romania	22	Romania	23	Romania
312	Romania	314	Romania	315	Romania
317	Romania	319	Romania	321	Romania
322	Romania	323	Romania	324	Romania
325	Romania	334	Romania	3	Russia / USSR
7	Russia / USSR	012	Russia / USSR	17	Russia / USSR
30	Russia / USSR	38	Russia / USSR	50	Russia / USSR
60	Russia / USSR	61	Russia / USSR	182	Russia / USSR
187	Russia / USSR	188	Russia / USSR	270	Russia / USSR
528	Russia / USSR	539	Russia / USSR	543	Russia / USSR
547	Russia / USSR	611	Russia / USSR	710	Russia / USSR
711	Russia / USSR	4397	Russia / USSR	270	Ukraine
11	Yugoslavia	011	Yugoslavia	12	Yugoslavia
14	Yugoslavia	122	Yugoslavia	IK	Yugoslavia
*NK	Yugoslavia	nny	Yugoslavia	PP	Yugoslavia

* Inverted Cyrillic N

Service Ammunition. Service ammunition is subdivided into ball cartridges and special-purpose cartridges.

- Ball ammunition is used to engage enemy personnel.

- Special-purpose ammunition, depending on its construction, is designed for target indication and correction of fire, igniting fuel and highly flammable objects, and for destroying lightly armored targets.

    - Tracer cartridges are designed for target indication, fire adjustment, signal purposes, and engaging personnel. Tracer bullets can ignite dry grass, etc. The path of the bullet is indicated by either a red or green flame, which can generally be seen day or night for a distance of 700 meters.

    - Armor piercing/armor piercing incendiary cartridges are used to destroy targets protected by thin armor at ranges up to 300 meters, such as light trucks and personnel wearing body armor.

    - Incendiary cartridges are used to destroy fuel in iron tanks up to 3-mm thick. Incendiary cartridges also contain a tracer element. The path of the bullet is indicated by either a red or green flame, which can generally be seen day or night for a distance of 700 meters.

    - Subsonic/low velocity cartridges are used with silenced weapons. They often have a muzzle velocity of around 300 m/s.

Training Ammunition. Training ammunition is sub-divided into drilled and blank cartridges.

- Drilled rounds are designed for training in loading and firing. On the body of the cartridge case there are longitudinal grooves, and on the cartridge case mouth there are marks from the clamping device. The primer is pierced. There is no propellant in the cartridge case.

- Blank cartridges are designed for simulating fire and are used in tactical exercises. There is no bullet in the blank cartridges. The mouth is sealed by a star (rosette) crimp. It is dangerous to stand closer than 10 meters away from the muzzle face when blank cartridges are being fired. If blanks are to be fired from the PK machinegun, a blank adapter must be fitted to the muzzle. Without a blank adapter, insufficient gas pressure is developed to properly cycle the weapon.

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UNITED STATES ARMY INTELLIGENCE AND THREAT ANALYSIS CENTER
11th MILITARY INTELLIGENCE COMPANY (TI) (REINF)

OPERATOR'S MANUAL

PKM MACHINE GUN (U)

9-8-10

OCTOBER 1979

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WARNING

Before starting an inspection, be sure to clear the weapon. Do not actuate the trigger until the weapon has been cleared. Inspect the chamber to insure that it is empty, and check to see that no ammunition is in position to be introduced.

WARNING

In the event of a misfire, the round will remain locked in the chamber for the prescribed time intervals, the gun trained on the target, and personnel cleared from the area.

WARNING

Allow the weapon to cool at least 5 minutes before attempting to open the cover assembly.

WARNING

Keep weapon trained on target.

WARNING

Care must be exercised to have the weapon pointed down range when loading.

WARNING

This weapon can NOT utilize NATO 7.62 mm x 51 ammunition. Consult the ammunition chart for proper ammunition. Failure to do so could cause damage to the weapon and severe injury to the operator.

DEPARTMENT OF THE ARMY
UNITED STATES ARMY INTELLIGENCE AND SECURITY COMMAND
UNITED STATES ARMY INTELLIGENCE AND THREAT ANALYSIS CENTER

OPERATOR'S MANUAL

MACHINE GUN, 7.62 mm x 54R, PKM, GENERAL PURPOSE (SOVIET)

11th Military Intelligence Company Publication Number 9-8-10

Short Title: PKM Machine Gun

This is not an official US Army publication. Information contained within was developed solely thru evaluation and analysis. This manual is designed to provide instructor guidance for presenting instruction, as required, on the PKM machine gun. This publication was prepared by the 11th Military Intelligence Company, Aberdeen Proving Ground, Maryland 21005. Other than normal exchange with other agencies at the working level, this document has not been coordinated outside INSCOM. Interpretation of intelligence information in this publication represents the views of INSCOM and may be subject to modification as a result of subsequent information.

PREFACE

PURPOSE

This publication provides an introduction to the Machine Gun, 7.62 mm x 54R, PKM, General Purpose (Soviet).

SCOPE

This manual contains instructions for the operation and maintenance of the PKM machine gun.

APPLICABILITY

This publication applies to all military personnel who require operator and maintenance information pertaining to the PKM machine gun.

COMMENTS

For clarity and familiarity, this manual is presented in the standard format for Department of the Army, Technical Manual, Operator's and Organizational Maintenance Manual (-12).

ADMINISTRATION

Recommendations for equipment publication improvements. Reports of errors, omissions, and recommendations for improving this publication by the user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded to: Commander, 11th Military Intelligence Company, ATTN: IAX-OF-11-CS, Aberdeen Proving Ground, Maryland 21005.

SUMMARY

This publication provides operator and organizational maintenance instruction on the PKM machine gun. The contents include operation of the weapon, disassembly, assembly and operator level maintenance procedures.

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CHAPTER 1

INTRODUCTION

1-1. Description

The Machine Gun, 7.62 mm x 54R, PKM, General Purpose (Soviet) is an open-bolt-fired, gas-operated, rotary-locked-bolt (KALASHNIKOV), belt-fed, fully automatic weapon (fig. 1-1).

Figure 1-1. Machine Gun, 7.62 mm x 54R, PKM, General Purpose (Soviet).

1-2. Differences Between PK Series Machine Guns

a. PK: The basic gun with a heavy fluted barrel, feed cover constructed from both machined and stamped components and a plain butt plate. The PK machine gun weighs about 9 kg (19.8 lbs).

b. PKS: The basic gun mounted on a tripod. The lightweight tripod, 4.75 kg (10.45 lbs), not only provides a stable mount for long range ground fire, it also can be quickly opened up to elevate the gun for antiaircraft fire.

c. PKT: The PK is altered for coaxial installation in an armored vehicle. The sights, stock, tripod, and trigger mechanism have been removed, a longer heavy barrel is installed, and a solenoid is fitted to the receiver back plate for remote triggering. An emergency manual trigger and safety is fitted.

d. PKM: A product improved PK, with a lighter weight, unfluted barrel, the feed cover constructed wholly from stampings, with a hinged butt rest fitted into the butt plate. Excess metal has been machined away wherever possible to reduce the weight.

e. PKMS: PKM mounted on a tripod.

1-3. Tabulated Data

a. Weapon

(1)	Caliber	7.62 mm x 54R
(2)	Operation	Gas
(3)	Fire Type	Full Automatic Only
(4)	Cyclic Rate	690-720 rpm
(5)	Practical Rate of Fire	250 rpm
(6)	Overall Length	47.0 in. (119 cm)
(7)	Weight Unloaded	18.5 lbs (8.4 kg)
(8)	Approximate Max Hor. Range	3800 m
(9)	Effective Combat Range	1000 m

b. Feed

(1)	Type	Belt (Non-Disintegrating Links)
(2)	Location	Right to Left
(3)	Belt Capacity	25 - 250 rounds (connectable 25 round sections)

1-3. Tabulated Data (cont)

c. Barrel

(1)	Length	23.75 in. (60.3 cm)
(2)	Approximate Muzzle Velocity	2741 fps (835 mps)

d. Sights

(1)	Front Type	Protected Cylindrical Post
(2)	Rear Type	Rectangular Notch, Tangent Ramp
(3)	Rear Sight Graduation	100-1500 m in 100 meter increments and battle setting approx. 330 meters
(4)	Adjustment	Front Sight: zero only Rear Sight: elevation and windage

e. Action

(1)	Locking Feature Type	Rotary Bolt
(2)	Full Automatic	Fire from open bolt
(3)	Trigger Type	Spur
(4)	Safety Type	Rotary Selector (safe or fire)
(5)	Location	Left side trigger guard

f. Stock

(1)	Type	Fixed
(2)	Material	Wood (laminated)

1-4. Weapon Identification

Markings located on the receiver group provide a ready means of identifying the weapon's country of origin (table 1-1).

Table 1-1. Weapon markings.

WEAPON MARKINGS

FACTORY	SELECTOR			COUNTRY
	SAFE-UPPER	MID	LOWER	
1954 г.		АВ	ОД	USSR
56-1		连	单	PRC
		L	D	PRC
M22		L	D	PRC
584		큰	단	N. KOREA
		AB	ЕД	BULG.
1962		C	P	POL.
1966	S	FA	FF	RUM.
63		D	E	E. GERM.
1951 г.		АВ	ОД	USSR
五六式		火		PRC
				PRC
				PRC
				E. GERM.
				PRC
216				PRC
		ПР	ОГОНЬ	USSR
		ПР	ОГОНЬ	USSR
				CZECH
		∞	1	HUNGARY
		...	.	FINLAND
		R	J	YUGOSLAVIA
		30	1	CZECH
63		D	E	E. GERM.
		리L	다L	N. KOREA
五六式		L	D	PRC

CHAPTER 2

OPERATING INSTRUCTIONS

SECTION I. LOADING THE NON-DISINTEGRATING BELT

2-1. Loading

a. The ammunition belts for the PKM machine gun are pre-loaded at ammunition factories in 25 round connectable belt lengths. To reuse the non-disintegrating belt lengths, the belt must be hand loaded.

b. To hand load the belt, insert 7.62 mm x 54R rounds, one at a time, into each opening of the belt from the large section of the belt to the small section. Push the round completely forward into each opening. A round is completely seated when the front ridge of the cartridge is aligned with the front of the smallest portion of the belt (fig. 2-1).

Figure 2-1. Proper insertion of round in belt.

2-1. Loading (cont)

WARNING: This weapon can not utilize NATO 7.62 mm x 51 ammunition. Consult ammunition chart at end of the manual for proper ammunition.

c. An improperly loaded round may cause the belt to feed incorrectly or cause the round to not properly chamber. Either of these actions will cause a stoppage (fig. 2-2).

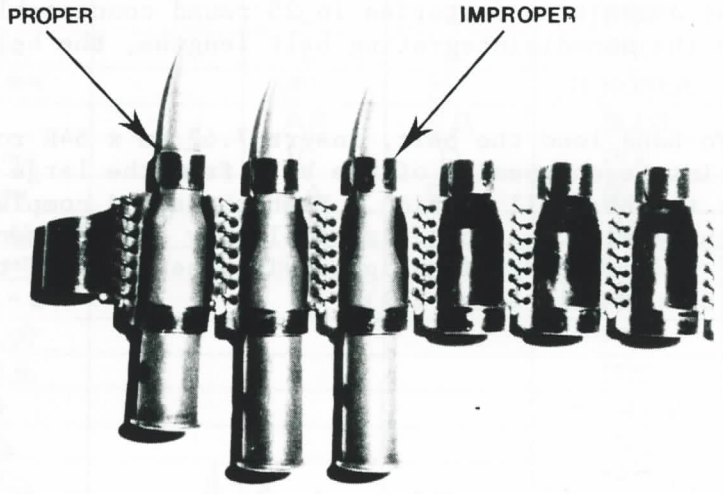


Figure 2-2. Improper insertion of round in belt.

d. Normal safety precautions of handling small arms ammunition should be observed at all times. Careful insertion of each round should avoid any accidental striking of the primer.

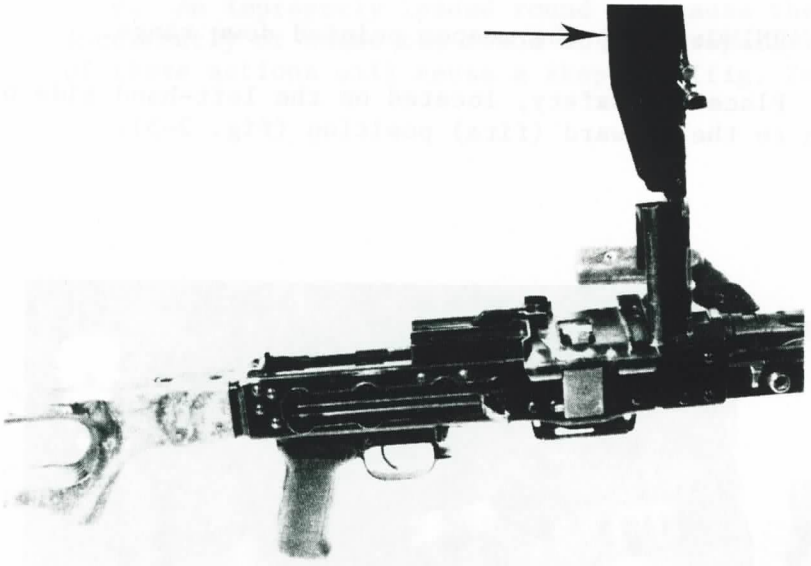


Figure 2-4. Receiver cover fully open.

c. Place the belt to feed from the right to the left. The solid portion of the belt will be facing up as each round enters the receiver. The belt is then placed in the feedway, coming in from the right, with the first round gripped in the claws of the cartridge gripper (fig. 2-5).

Note: The ammunition belt will not feed into the PKM machine gun from the left-hand side of the weapon. If the belt is placed into the weapon from the left-hand side, improper feeding will result, causing the belt to be kicked out of the weapon.

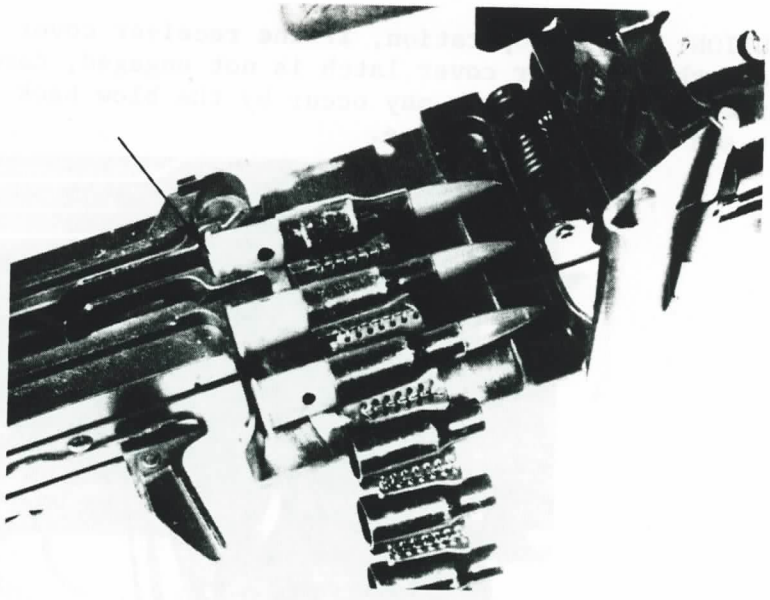


Figure 2-5. First round properly loaded.

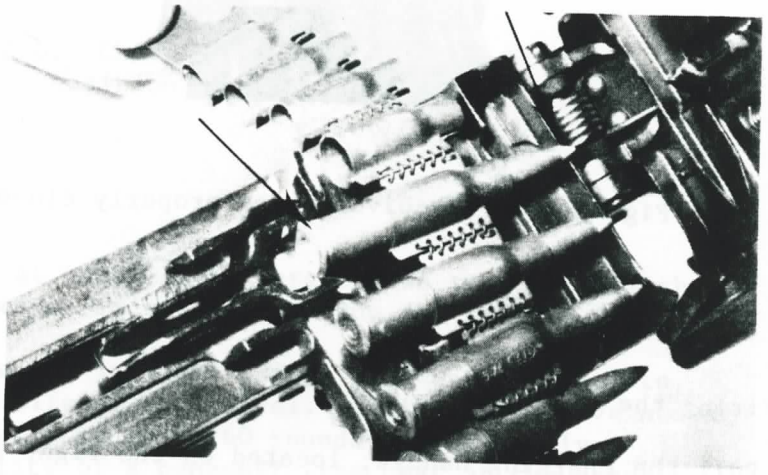


Figure 2-6. First round improperly loaded.

2-2. Loading the PKM Machine Gun (cont)

d. Close the receiver cover of the weapon, insuring that the receiver cover latch is engaged (fig. 2-7).

CAUTION: During operation, if the receiver cover is not closed and the receiver cover latch is not engaged, damage to the receiver cover and operator may occur by the blow back action of the bolt and expended cartridge.

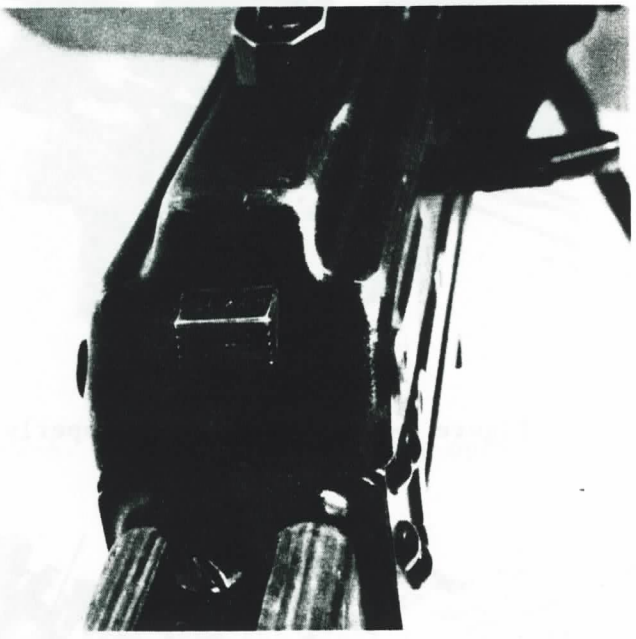


Figure 2-7. Receiver cover properly closed.

2-3. Firing the PKM Machine Gun

a. Pull the charging handle, located on the right side of the weapon, completely to the rear. This will extract the first round of ammunition from the belt. Release the charging handle allowing it to go forward unassisted. This action chambers the first round. The PKM is now ready for firing (fig. 2-8).

2-3. Firing the PKM Machine Gun (cont)

Note: To insure that the chambered round is seated properly, give the charging handle a slight push forward with the palm of the right hand.

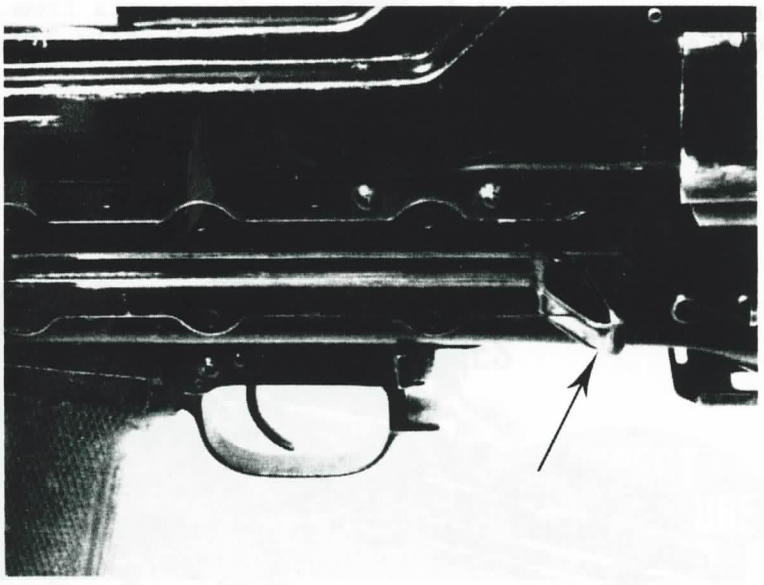


Figure 2-8. Charging handle in forward position for firing.

b. Aim the weapon at the desired target down range. Pull the trigger, firing the weapon in six (6) to nine (9) round bursts.

Note: Firing the PKM in short bursts allows the barrel to cool and prolongs the life of the barrel. Test results have shown that continuous fire of more than 260 rounds significantly increases the possibility of a cook-off (the heat of the barrel exploding a chambered round).

SECTION III. ZEROING THE PKM MACHINE GUN

2-4. General

a. The PKM machine gun is equipped with a protected, open post type front sight adjustable in elevation only. The rear sight is a square notch leaf sight adjustable in both windage and elevation The rear sight is graduated in 100 meter increments from 1 to 15 and includes a battle sight setting of approximately 330 meters (figs 2-9 and 2-10).

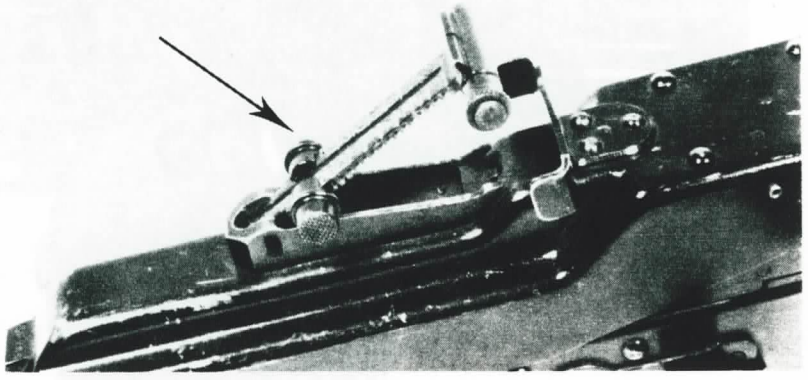


Figure 2-9. Adjustable rear sight.

Figure 2-10. Front sight.

2-4. General (cont)

b. During adjustment of the sights of the PKM machine gun, a proper sight picture should be maintained at all times (fig. 2-11).

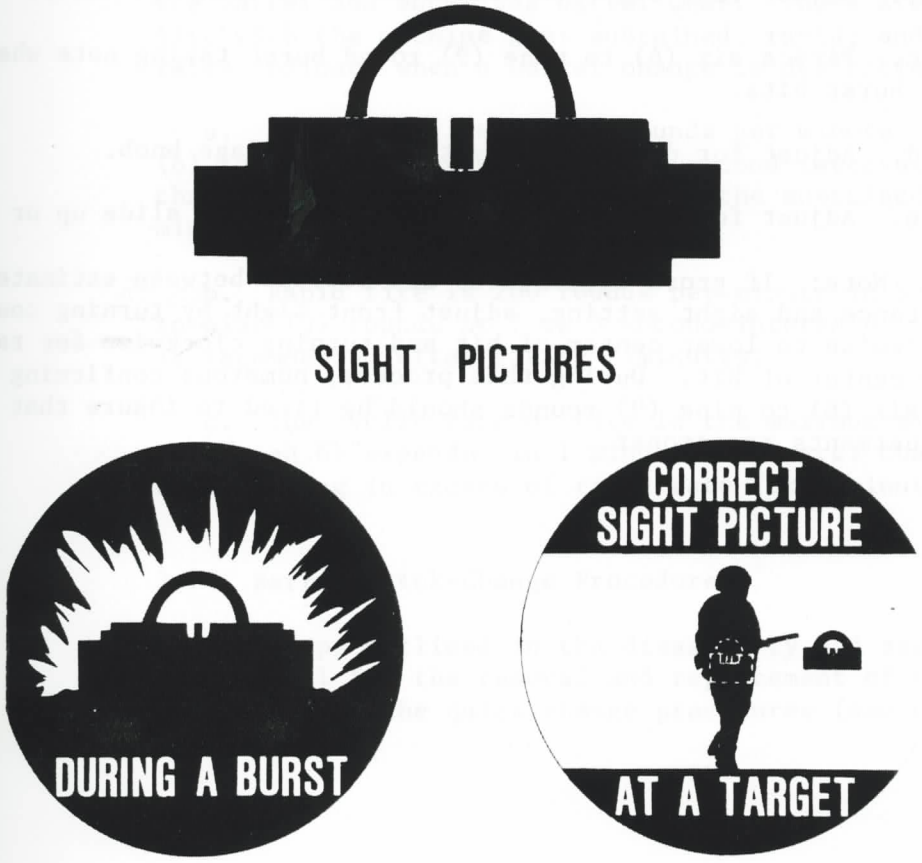


Figure 2-11. Sight picture for PKM machine gun.

2-5. Procedures

Note: Because target ranges are not usually available for use with this weapon, field zeroing will be the only technique discussed.

a. Select a target between 300 and 600 meters distant.

b. Adjust rear sight to estimated range (windage zero).

c. Fire a six (6) to nine (9) round burst taking note where the burst hits.

d. Adjust for deflection by twisting windage knob.

e. Adjust for elevation by moving rear sight slide up or down.

Note: If gross differences are noticed between estimated distance and sight setting, adjust front sight by turning counter-clockwise to lower center of hit and turning clockwise for raising the center of hit. During this process, numerous confirming bursts of six (6) to nine (9) rounds should be fired to insure that adjustments are proper.

SECTION IV. BARREL QUICK-CHANGE

2-6. General

If an extra barrel is available, the quick changing of barrels becomes possible. The changing of barrels prolongs the life of the barrel and equalizes barrel wear. There are three rates of fire with the machine gun: sustained, rapid, and cyclic. These rates indicate when a barrel change is desirable.

a. Sustained fire is 100 rounds per minute in bursts of six (6) to nine (9) rounds at 4 to 5 second intervals. A barrel change is recommended after firing the sustained rate for 10 minutes.

b. Rapid fire is 200 rounds per minute in bursts of six (6) to nine (9) rounds at 2 to 3 second intervals. A barrel change is recommended after firing 2 minutes.

c. The cyclic rate of fire is the maximum amount of ammunition which can be expended in 1 minute. A barrel change is recommended after firing in excess of rapid rate for 1 minute.

2-7. Barrel Quick-Change Procedures

The steps outlined in the disassembly and assembly portion of this manual for the removal and replacement of the barrel are the steps used in the quick-change procedures (see chapters 3 and 5).

SECTION V. TROUBLESHOOTING

2-8. Malfunctions and Immediate Action

A malfunction is a failure of the gun to function satisfactorily. Defective ammunition or improper operation of the gun by a crew member is not considered a malfunction of the gun. Two of the more common malfunctions of the PKM machine gun are sluggish operation and a runaway gun.

a. Sluggish operation and corrective action. Sluggish operation of the gun usually is due to excessive friction caused by dirt or carbon, lack of proper lubrication, burred parts or excessive loss of gas. Clean and lubricate the gun and inspect throughly for burred parts and replace as necessary.

b. Runaway gun and corrective action. A runaway gun is a gun that continues to fire after the trigger is released. It may be caused by a worn sear, worn sear notch, or short recoil i.e., the operating group recoils to feed and fire but not sufficiently enough for the sear to engage the sear notch. Short recoil may be caused by loss of gas or excessive carbon buildup in the operating rod tube.

CAUTION: Hold fire on target until feeding of ammunition is stopped.

(1) Raise the receiver cover, thus stopping the feed action.

(2) Grasp the cocking handle firmly and pull it to the rear to stop the bolt from going forward.

(3) Clear the weapon.

(4) Disassemble the weapon and check for wear. Check the gas port plug, gas cylinder extension and clean the operating rod. Replace parts as necessary.

2-9. Misfire

a. In the event of a misfire, attempt to charge the weapon by applying forward pressure on the charging handle. Attempt to fire the weapon again.

2-9. Misfire (cont)

b. If the weapon does not fire, with a cool weapon (less than 200 rounds fired) pull the cocking handle to the rear extracting the misfired round. Return the cocking handle to the forward position and attempt to fire the weapon.

c. If the weapon still does not fire, inspect the extracted rounds for indications that the primer of the round has been struck. If it has, the ammunition is probably faulty and a new lot of ammunition should be selected. If the round shows no indication of being struck, inspect the bolt assembly/firing pin for damage.

d. If the weapon does not fire, with a hot weapon (more than 200 rounds fired) wait 5 minutes before recocking the weapon and extracting misfired round. This procedure will allow a safety factor in the event of a cook-off (heat of the barrel igniting a chambered round).

e. After the 5 minute waiting period, follow steps b and c to continue firing the weapon.

CHAPTER 3

DISASSEMBLY

3-1. General

a. In order to insure proper functioning of the PKM machine gun, it is necessary to disassemble the weapon and inspect and clean the internal components. The names of the components of the PKM machine gun can be learned through practice in the disassembly and reassembly of the weapon. Generally, the parts are named for the functions they perform; for example, the trigger guard guards the trigger, the retracting handle is used to manually retract the bolt to the rear of the weapon etc.

b. As the weapon is being disassembled, lay out the parts in the order of their removal. This procedure will assist you in the assembly of the weapon.

3-2. Disassembly of the PKM Machine Gun

The disassembly of the PKM machine gun is done in the following order:

a. Clear and check the machine gun to insure that it is free of ammunition.

b. Place the weapon on a flat surface, muzzle pointing in a safe direction (fig. 3-1) with the bipod legs extended.

c. Grasp the weapon by the buttstock; with the free hand, depress the receiver latch button (fig. 3-2).

Figure 3-1. PKM machine gun placed on flat surface, muzzle pointing in safe direction, bipod legs extended.

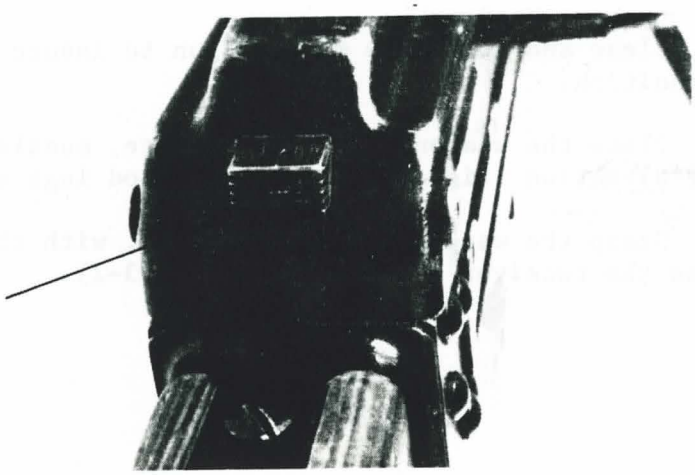


Figure 3-2. Receiver cover latch located at the rear of the weapon.

3-2. Disassembly of the PKM Machine Gun (cont)

d. Raise the receiver cover to the fully open position (fig. 3-3).

e. Raise the feed tray cover (fig. 3-4) to the fully open position (fig. 3-5) to expose the internal working parts.

Figure 3-3. Receiver cover fully open.

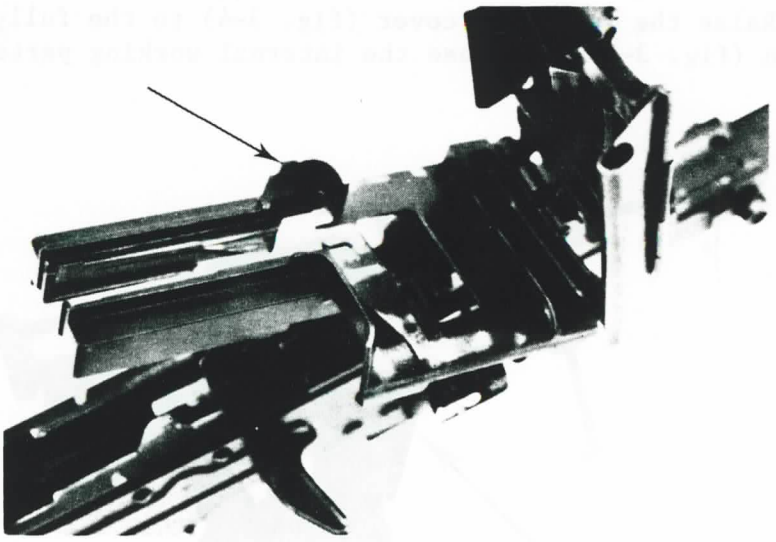


Figure 3-4. Ammunition feed tray cover.

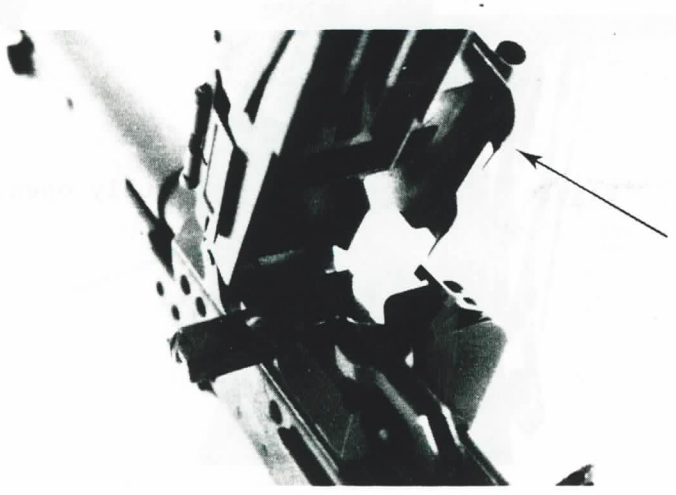


Figure 3-5. Ammunition feed tray cover in the fully open position.

3-2. Disassembly of the PKM Machine Gun (cont)

f. With the ammunition feed tray cover raised, leave the cartridge space gripper and bolt in the forward position (fig. 3-6); grasp the guide rod and mainspring while pushing forward; extract the mainspring and guide rod (fig. 3-7)

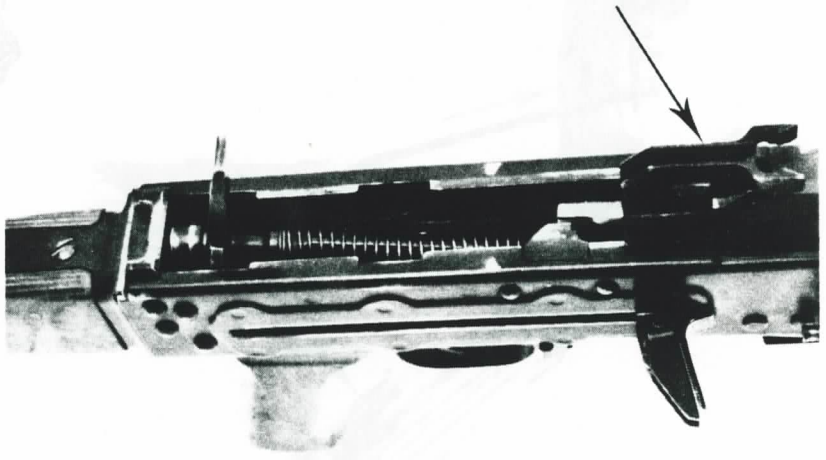


Figure 3-6. Cartridge space gripper and bolt in the forward position.

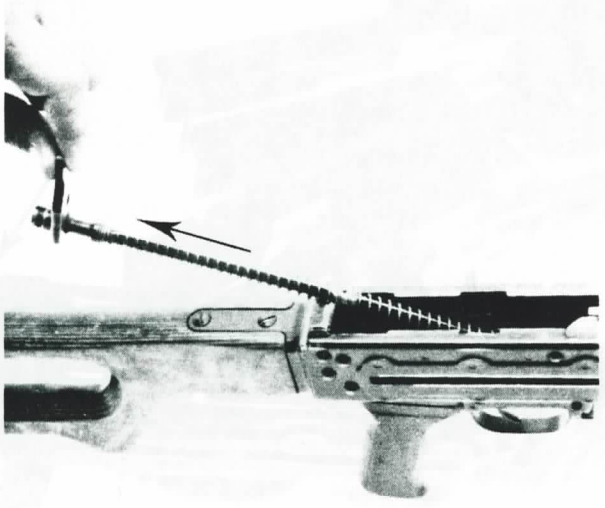


Figure 3-7. Retracting the guide rod and mainspring from the receiver.

g. To remove the cartridge space gripper, piston rod and bolt from the receiver, grasp the cartridge space gripper (fig. 3-8) and pull to the rear of the receiver. Align the notches on the bolt with the notches on the receiver (fig. 3-9). Pull up on the cartridge space gripper and remove the entire section from the receiver (fig. 3-10).

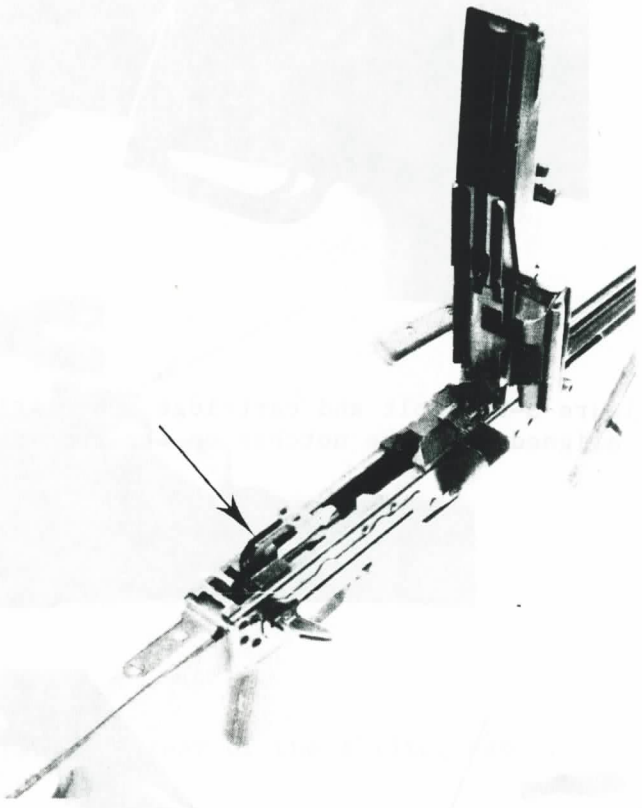


Figure 3-8. Cartridge space gripper and bolt retracted to the rear of the receiver.

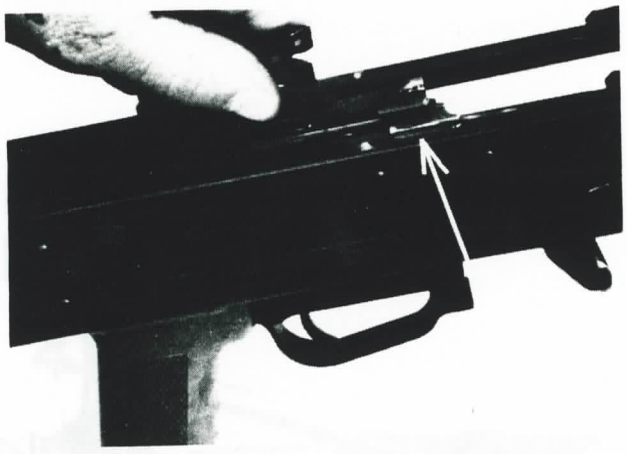


Figure 3-9. Bolt and cartridge space gripper aligned with the notches on the receiver.

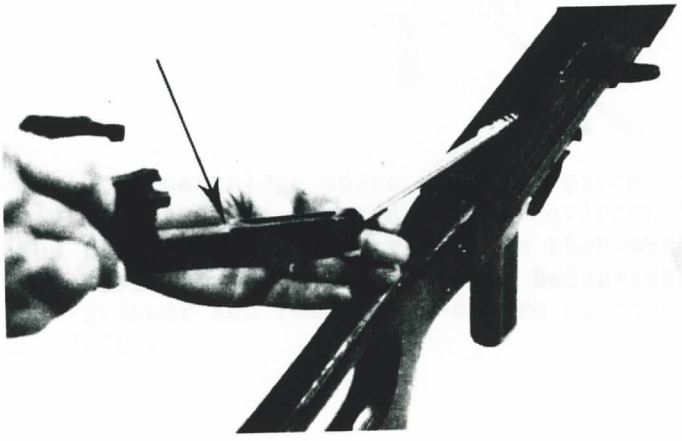


Figure 3-10. Removal of cartridge space gripper, bolt and piston rod.

3-2. Disassembly of the PKM Machine Gun (cont)

h. To separate the bolt and firing pin from the sliding cam, rotate the bolt and firing pin to the rear of the cam in a counter-clockwise motion (fig. 3-11). Pull the bolt and firing pin forward while aligning the notch on the firing pin with the notch on the sliding cam (fig. 3-12).

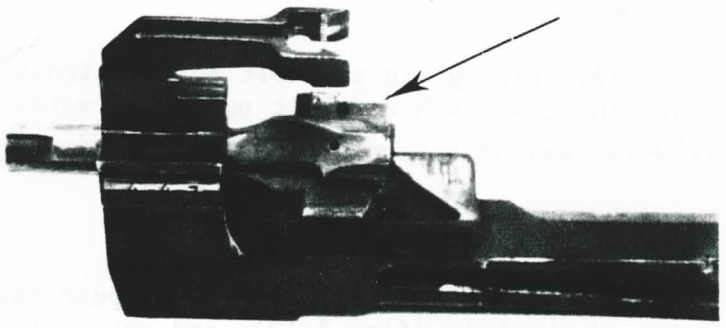


Figure 3-11. Bolt rotated to rear of the sliding cam.

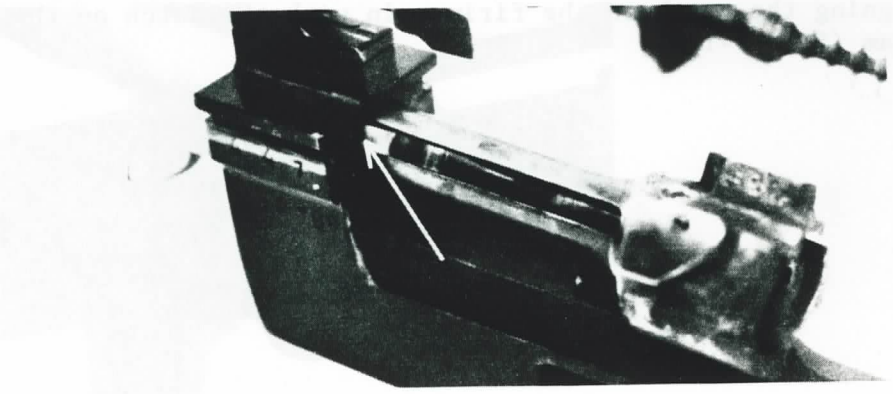


Figure 3-12. Firing pin and bolt notch aligned with sliding cam notch and bolt pulled forward.

i. To remove the firing pin from the bolt, push the firing pin to the rear of the bolt (fig. 3-13), and rotate the bolt upside down extracting the firing pin (fig. 3-14).

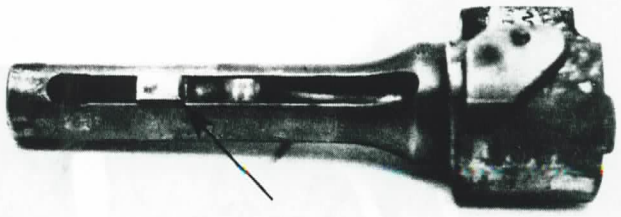


Figure 3-13. Firing pin pushed to rear of bolt.

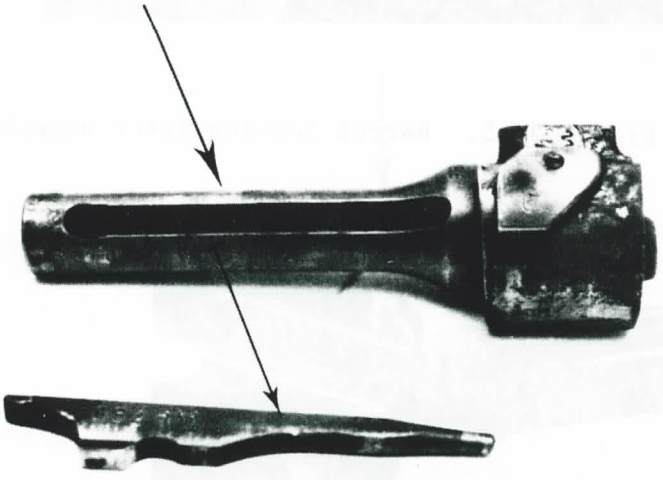


Figure 3-14. Firing pin extracted from bolt.

3-2. Disassembly of the PKM Machine Gun (cont)

j. The final step in the disassembly of the PKM machine gun is to remove the barrel. This is done by pushing the barrel locking latch (fig. 3-15) completely to the left-hand side of the receiver (fig. 3-16). Grasp the barrel quick-change handle (fig. 3-17) and pull the barrel forward, disengaging the barrel from the barrel receiver group (fig. 3-18).

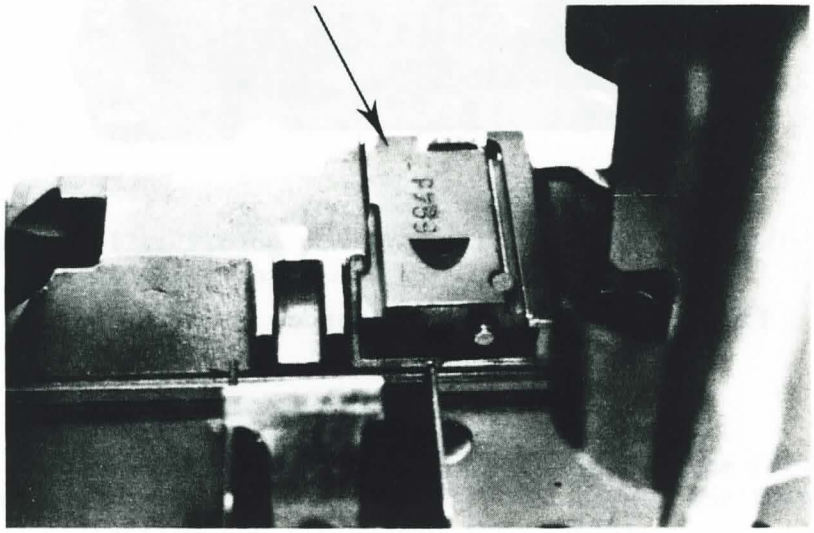


Figure 3-15. Barrel locking latch assembly.

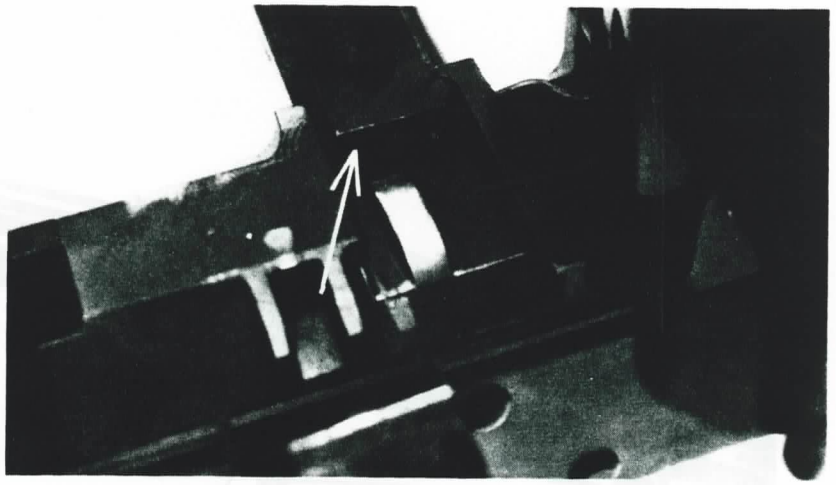


Figure 3-16. Barrel locking latch assembly pushed completely to the left.

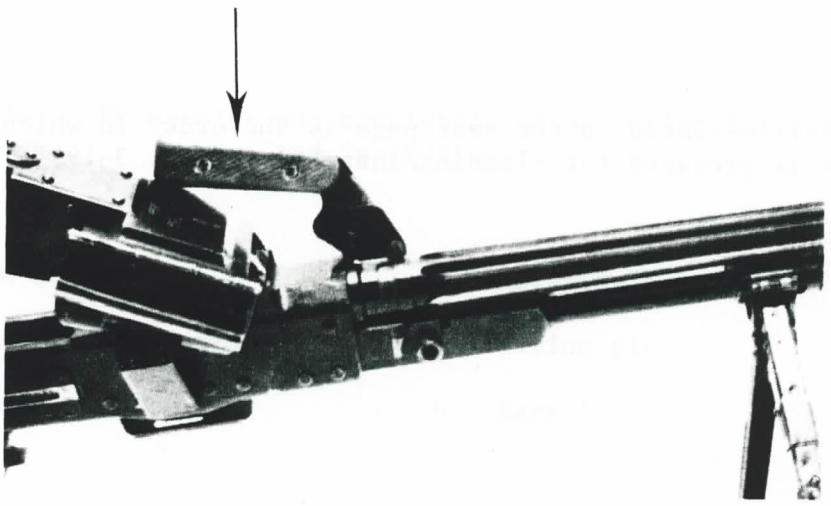


Figure 3-17. Barrel quick-change handle.

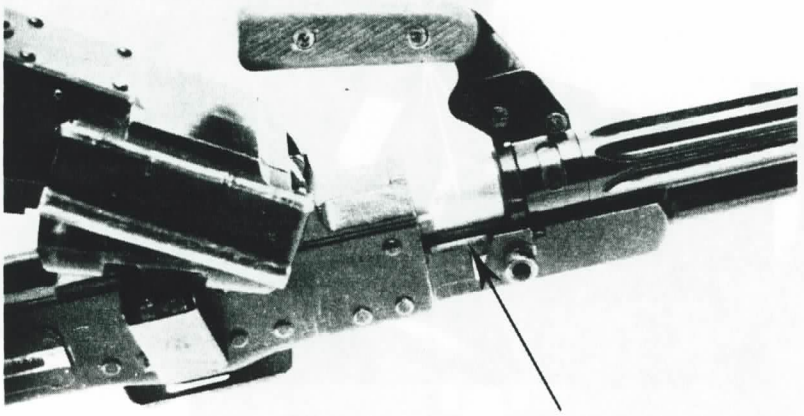


Figure 3-18. Barrel pulled forward from barrel receiver group.

k. Illustrated on the next page is the order in which the weapon is prepared for cleaning/inspection (fig. 3-19).

Figure 3-19. PKM machine gun completely disassembled for cleaning and inspection.

1. Main body
2. Guide rod and mainspring
3. Sliding cam
4. Rotating bolt
5. Firing pin
6. Barrel

CHAPTER 4

MAINTENANCE

SECTION I. INSPECTION

4-1. General

Periodically and after firing the PKM machine gun must be cleaned and inspected. Proper maintenance can be accomplished after disassembling the weapon into its major groups as indicated in the last chapter.

4-2. Inspection of Operating Groups

The firing pin should be checked for wear on the tip. The operating rod and operating spring and the firing must not be chipped, bent, or broken. The ejector and extractor should be checked to see that they are under spring pressure and not chipped or worn. The trigger housing group should not show signs of excessive wear. The barrel should be checked for cracks, burrs and bends.

SECTION II. MAINTENANCE

4-3. Cleaning and Lubrication

a. Immediately after firing and on two consecutive days thereafter, throughly clean the bore, chamber, and the parts that have become powder fouled, with bore cleaner (cleaning compound, solvent; CR). Do not wipe dry. On the third day after firing, clean with bore cleaner, wipe dry, and lightly coat with oil.

b. Weekly when the gun is not being fired, clean the bore and the chamber with bore cleaner, wipe dry, and oil.

c. The rest of the gun should be cleaned with dry cleaning solvent (SD) immediately after firing and weekly thereafter. Wipe dry and oil.

d. Do not clean the inside of the gas system unless blank ammunition has been fired, or unless the gun fires sluggishly.

4-4. Lubrication

a. Lubricate the weapon with lubricating oil and keep it covered as much as possible.

b. In hot and humid climates, inspect the gun more frequently for signs of rust. Keep the gun free of moisture and lightly oiled with lubricating oil. If the gun is exposed to salt air, high humidity, or water, clean and oil more frequently to remove contamination and excess oil.

c. In hot and dry climates such as sandy and dusty areas, keep the gun free of oil to prevent sand and dust from collecting in the working parts.

d. The following maintenance equipment used with the weapon for cleaning (fig. 4-1) is found within the PKM machine gun. The butt of the stock is hollowed out and fitted with a spring cover to provide for storage of the cleaning equipment. Cleaning rods are normally stored with the stamped metal legs of the bipod.

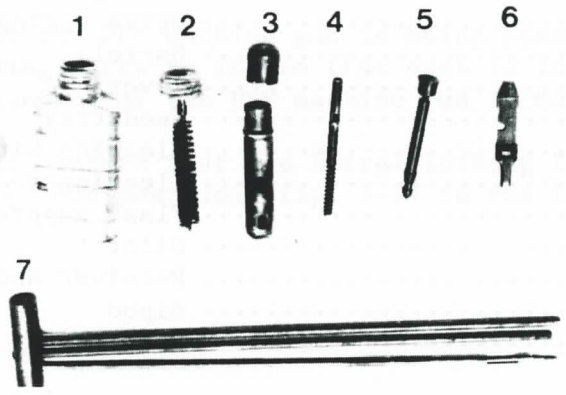


Figure 4-1. Maintenance equipment used with the PKM machine gun.

1. Oil can
2. Bore brush
3. Case cover
4. Draft
5. Puller
6. Screw driver
7. Cleaning rod assembly

SECTION III. FIELD STRIPPED WEAPON

Table 4-1. Component Nomenclature

Part Number	Nomenclature
1	Piston and slide
2	Bolt
3	Firing pin
4	Drive spring and guide
5	Barrel
6	Cover
7	Feed tray
8	Cleaning kit
9	Cleaning rod
10	Flash suppressor
11	Oiler
12	Receiver and stock
13	Bipod
14	Butt rest

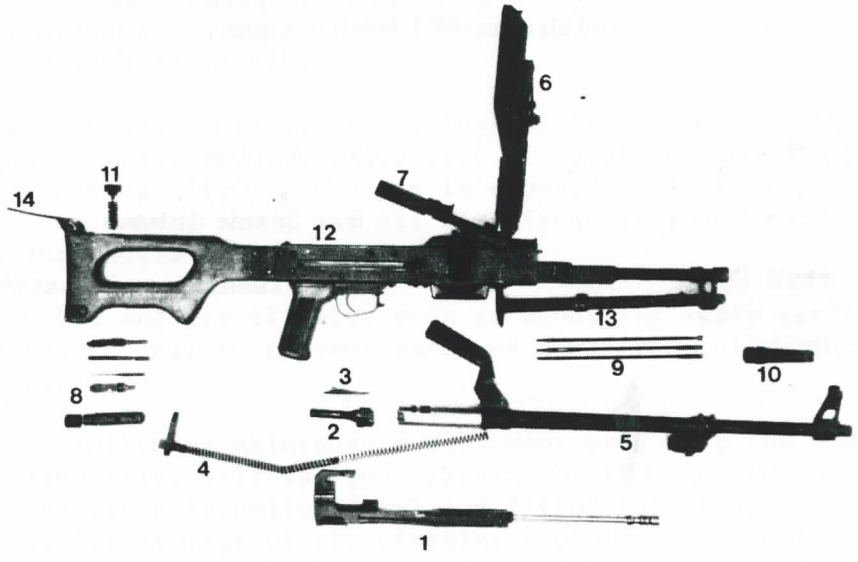


Figure 4-2. PKM machine gun field stripped

CHAPTER 5

ASSEMBLY

5-1. Assembly of the PKM Machine Gun

As the PKM machine gun is being assembled, inspect the internal working parts to insure that each is in working order. The reassembly of the PKM machine gun is done in the following order:

a. Insure that the barrel locking latch assembly is in the fully open position (fig. 5-1) to the left of the receiver.

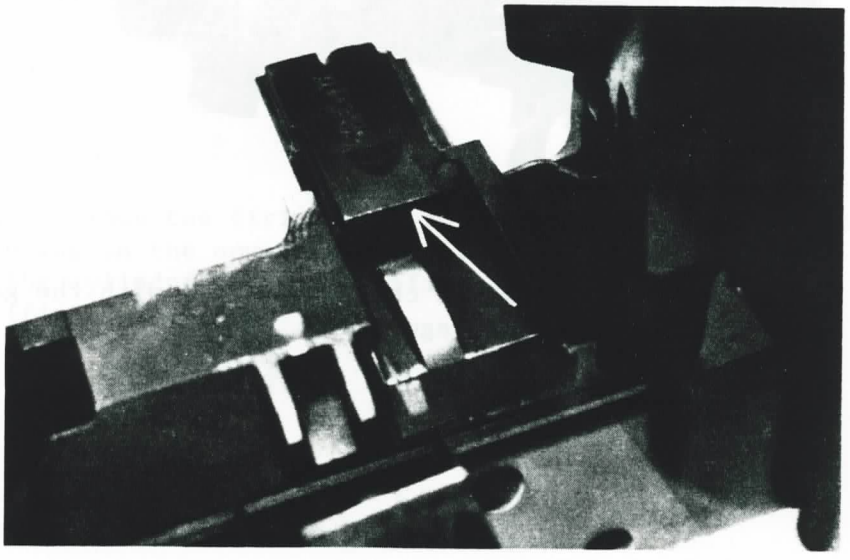


Figure 5-1. Barrel locking latch assembly in the fully open position to left of the receiver.

5-1. Assembly of the PKM Machine Gun (cont)

b. Insert the rear of the barrel into the barrel receiver group while aligning the gas escape chamber located on the bottom of the barrel with the gas regulator on the bottom of the barrel receiver group (fig. 5-2).

c. Close the barrel locking latch assembly by sliding the barrel locking latch to the right of the receiver (fig. 5-3). This will lock the barrel in place.

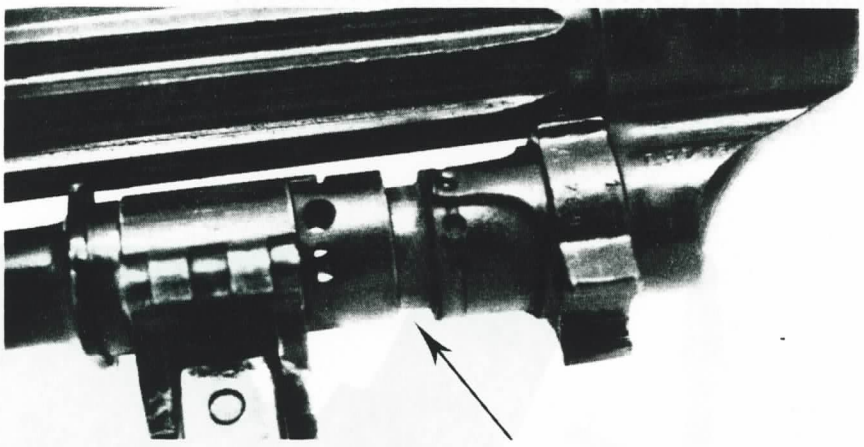


Figure 5-2. Gas escape chamber aligned with the gas regulator.

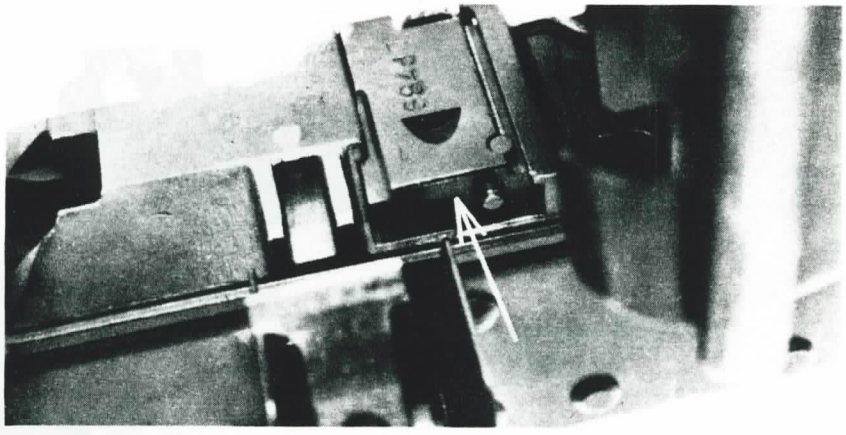


Figure 5-3. Barrel locking latch in closed position to right of receiver.

d. To replace the firing pin, rotate the bolt with the long groove facing in the upward position. Insert the firing pin while pushing the cylindrical portion (fig. 5-4) of the firing pin forward (fig. 5-5).

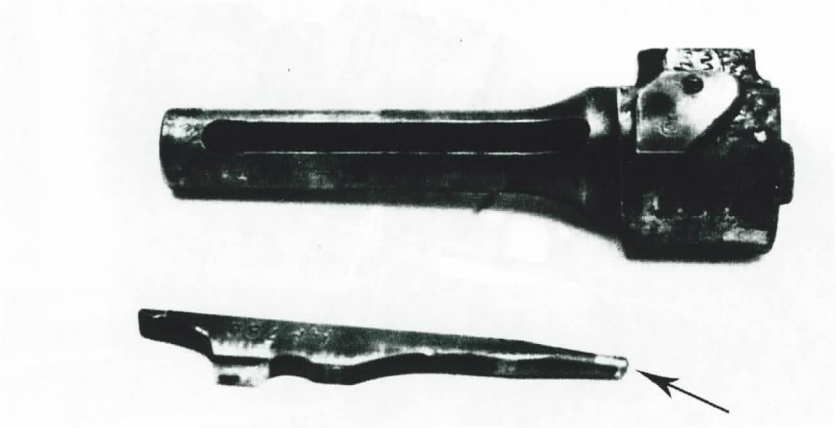


Figure 5-4. Cylindrical portion of the firing pin.

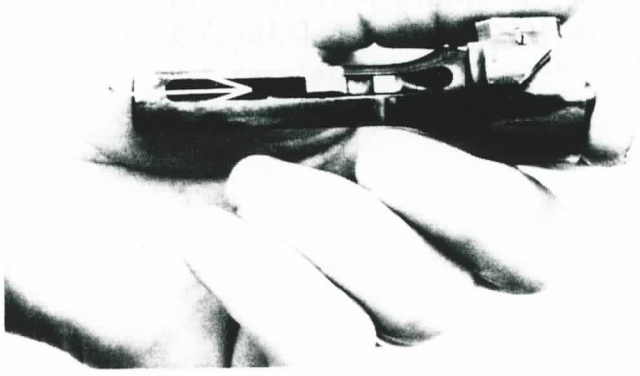


Figure 5-5. Firing pin in the forward position.

5-1. Assembly of the PKM Machine Gun (cont)

e. To replace the rotating bolt in the sliding cam, align the notch on the firing pin with the groove on the sliding cam (fig. 5-6). Push the rotating bolt to the rear while turning the rotating bolt clockwise (fig. 5-7).

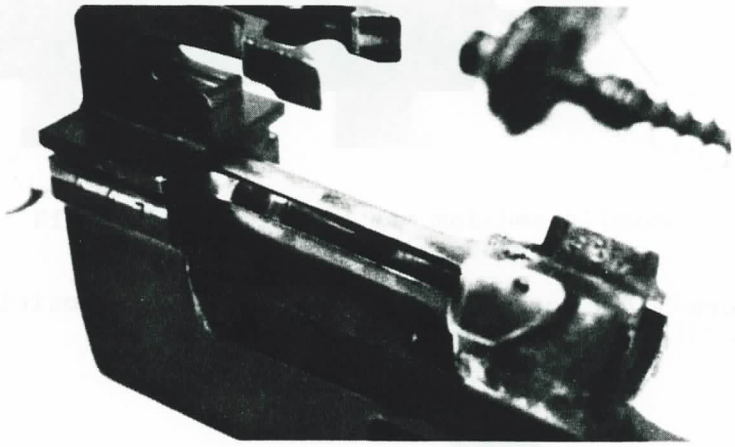


Figure 5-6. Rotating bolt inserted, and groove on sliding cam aligned with notch on firing pin.

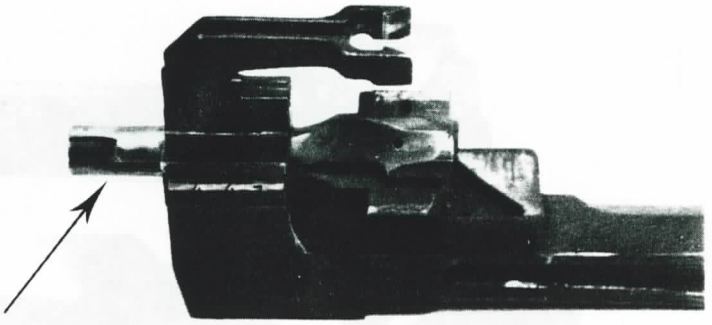


Figure 5-7. Rotating bolt in the rearward position of the sliding cam.

f. To insert the sliding cam and cam piston into the receiver, align the notches on the sliding cam (fig. 5-8) with the grooves on the receiver group. Slide the sliding cam and piston (fig. 5-9) while depressing the trigger.

Figure 5-8. Sliding cam notches aligned with receiver group grooves.

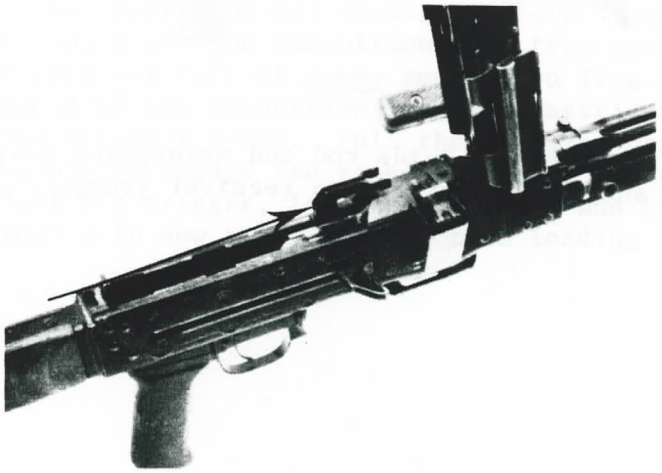


Figure 5-9. Sliding cam and piston in forward position.

5-1. Assembly of the PKM Machine Gun (cont)

g. To insert the mainspring and guide rod, align the mainspring and guide rod with the rear opening of the sliding cam (fig. 5-10). Push the mainspring and guide rod forward and down until the notch at the end of the guide rod is seated in the receiver group (fig. 5-11).

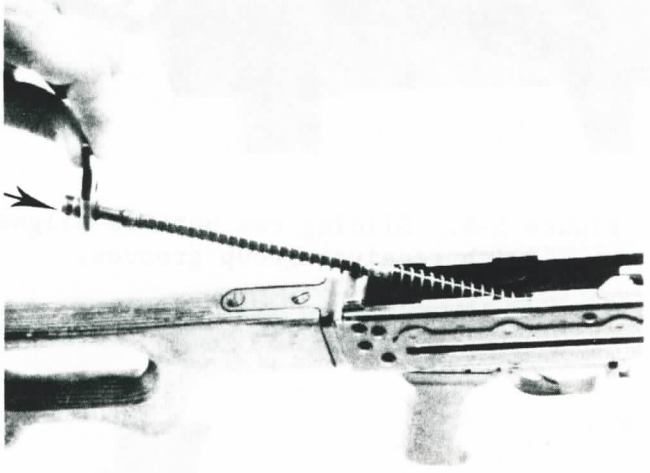


Figure 5-10. Guide rod and mainspring aligned and pushed forward in receiver group.

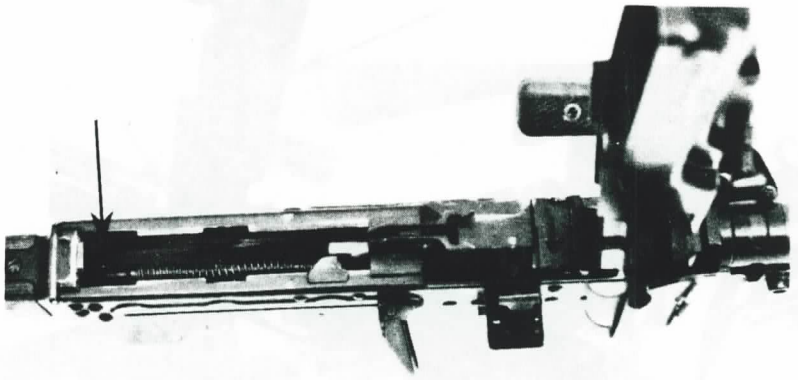


Figure 5-11. Guide rod seated in the receiver group.

h. After the mainspring has been inserted into the receiver group, close the ammunition feed tray cover (figs 5-12 and 5-13); insert one belt of dummy ammunition (fig. 5-14), placing the first round of the ammunition into the cartridge space gripper and close the receiver cover. Pull the charging handle to the rear of the weapon to engage the round then push the charging handle forward. Pull the trigger, letting the round and the bolt go forward; the weapon is now ready for practice loading and firing.

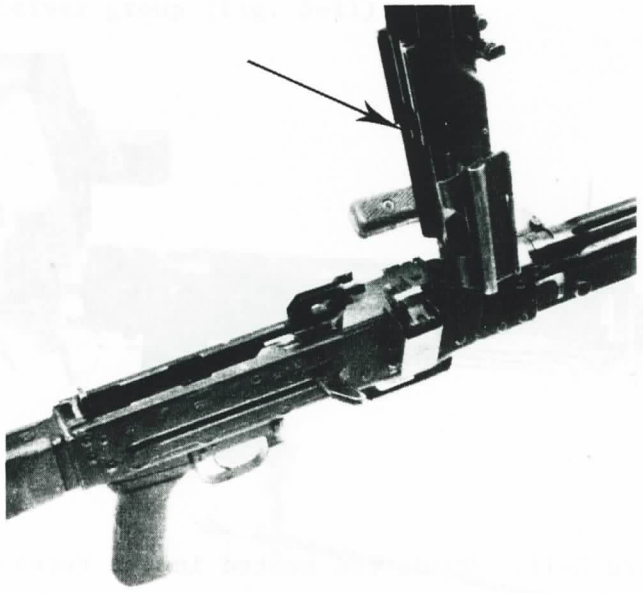


Figure 5-12. Ammunition feed tray cover open.

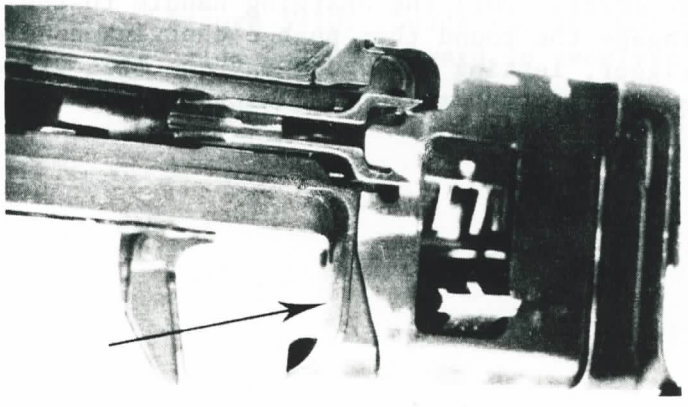


Figure 5-13. Ammunition feed tray cover closed.

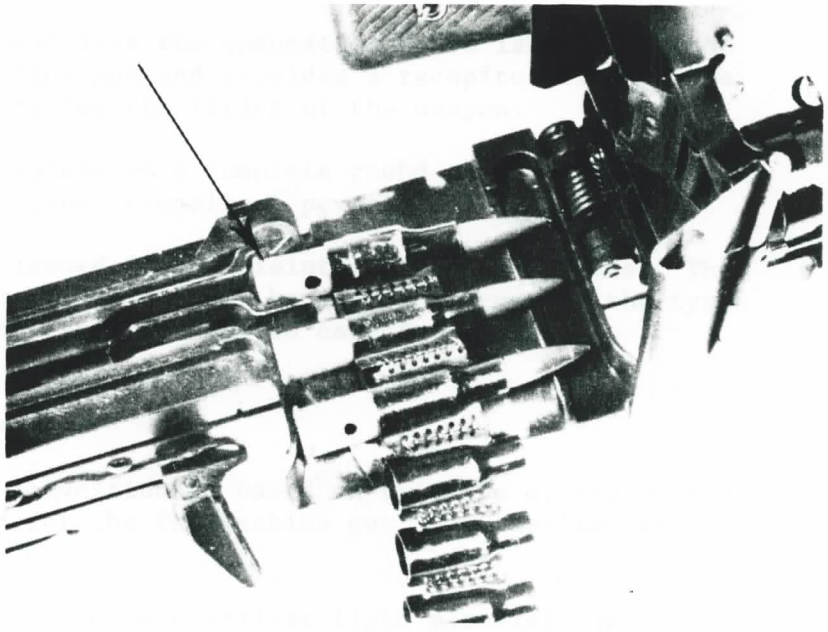


Figure 5-14. Insertion of the belt of dummy ammunition.

Note: To obtain dummy ammunition for training purposes, submit a DA Form 581 to the S-4 section servicing your unit requesting that the ammunition be inerted.

CHAPTER 6

AMMUNITION

6-1. Ammunition to be used with the PK Machine Gun

a. This chapter describes the ammunition to be issued with the 7.62 mm x 54R PKM machine gun and provides a recapitulation of the ammunition requirements for the firing of the weapon.

b. Ammunition is issued as a complete round consisting of the projectile, cartridge case, propellant powder, and the primer.

c. Ammunition is issued in non-disintegrating link belts. The members of the machine gun crew must be able to recognize the types of ammunition available and know how to care for them.

6-2. Ammunition Data

Classification of ammunition is based on the type of projectile. Ammunition authorized for the PKM machine gun is classified as follows:

a. Ball cartridges - for use against light material targets and personnel and during training.

b. Armor-piercing cartridges - for use against lightly armored targets where armor-piercing effects are desired.

c. Armor-piercing, incendiary - for desired armor-piercing effects combined with fire producing (incendiary) effects.

d. Tracer cartridges - for observation of fire, incendiary effects, signaling and for use during training.

e. Dummy cartridges - for use during training.

f. Blank cartridges - for use during training when simulating live fire.

6-2. Ammunition Data (cont)

Note: If blanks are to be fired from the PKM machine gun, a blank adapter must first be fitted to the muzzle. Without the blank adapter, insufficient gas pressure is developed to properly cycle the weapon.

6-3. Ammunition Characteristics

Ammunition of the 7.62 mm x 54R cartridge type are manufactured in the USSR and some Warsaw Pact countries. The 7.62 mm x 54R cartridges may be encountered in both brass and copper washed cases; however, steel cases have been predominant in recent years. The 7.62 mm x 54R cartridges are rimmed, bottlenecked, and have a length of 54 mm. The primer for the 54R case is an embedded type.

Table 6-1. Ammunition Types

Type	Designation	Bullet Tip Color	Charge
LP Ball	Low Velocity	Entire Cartridge Green	40 grains
LP Ball	L	None	48 grains
HP Ball	D	Yellow	50 grains
HP Ball	LPS	Silver or Aluminum	49 grains
AP	B-30	Black	48 grains
API	M 1932 Type B-32	Black and Red	49 grains
API	M 1940 Type BS-40	Black and Red	48 grains
APT	BT	Purple	40 grains
APIT	BTZ	Purple and Red	48 grains
Tracer	M 1930 Type T	Green	45 grains
Tracer	Type T 46	Green	48 grains
Incendiary Ranging	ZP	Red	40 grains
Blank	Training	Crimped, purple-rose	45 grains

6-3. Ammunition Characteristics (cont)

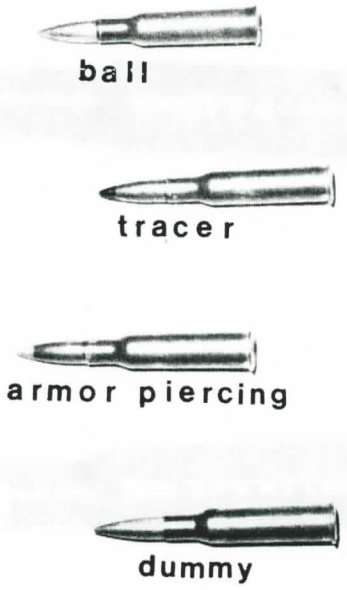


Figure 6-1. Different types of 7.62 mm x 54R ammunition.

6-4. Soviet and NATO Ammunition

The 7.62 mm x 54R Soviet ammunition (bottom) and 7.62 mm x 51 NATO ammunition (top) in figure 6-2 are NOT interchangable. Firing NATO ammunition in this weapon could cause severe damage to the weapon and grave injuries to the firer.

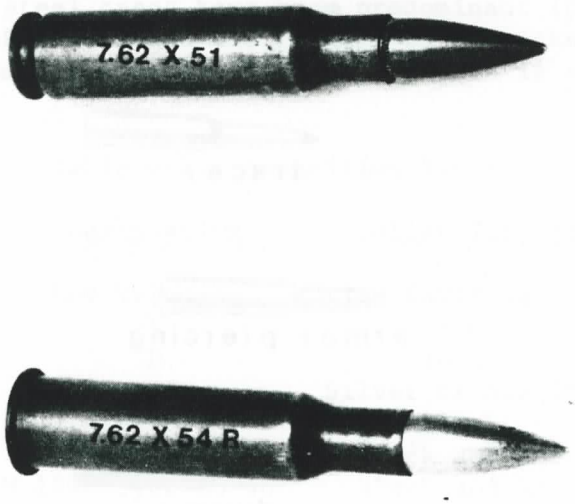


Figure 6-2. NATO (top) and Soviet (bottom) 7.62 mm ammunition.

Instruction Manual

Romak – 3
Dragunov
7.62x54R

WARNING:

Before using this firearm, read carefully
and follow these instructions.

This instruction manual should always
accompany the firearm and be transferred
with it upon change of ownership.

Safety Guidelines

For Proper Operation and Handling of Your Dragunov Rifle.

1. Understand and follow all basic firearm rules of safe handling.
2. Keep the muzzle of your firearm pointed in a safe direction.
3. Keep firearm unloaded when not in use.
4. Be absolutely certain of your target and the backstop before proceeding to fire (Remember before pulling the trigger that this is a high power, long range weapon).
5. Before loading your firearm, examine the bore to make certain it is unobstructed. Firing a gun with any obstruction in the bore or even a heavy coating of oil or drops of water can cause the barrel to rupture upon firing, causing serious injury to the shooter and bystanders.
6. Never exclusively rely on your gun's safety. Please exercise good judgement.
7. Don't shoot at a hard surface or at water. A bullet may ricochet and travel in unpredictable directions with considerable velocity causing injury and damage to property.
8. Never handle a firearm without checking to make sure that it is unloaded.
9. In case of failure to fire, keep muzzle pointed in a safe direction for at least 30 seconds. After 30 seconds, remove the magazine and slowly open the action to retrieve the cartridge. Then properly dispose of the mis-fired round.
10. <u>Always use eye and ear protection.</u>

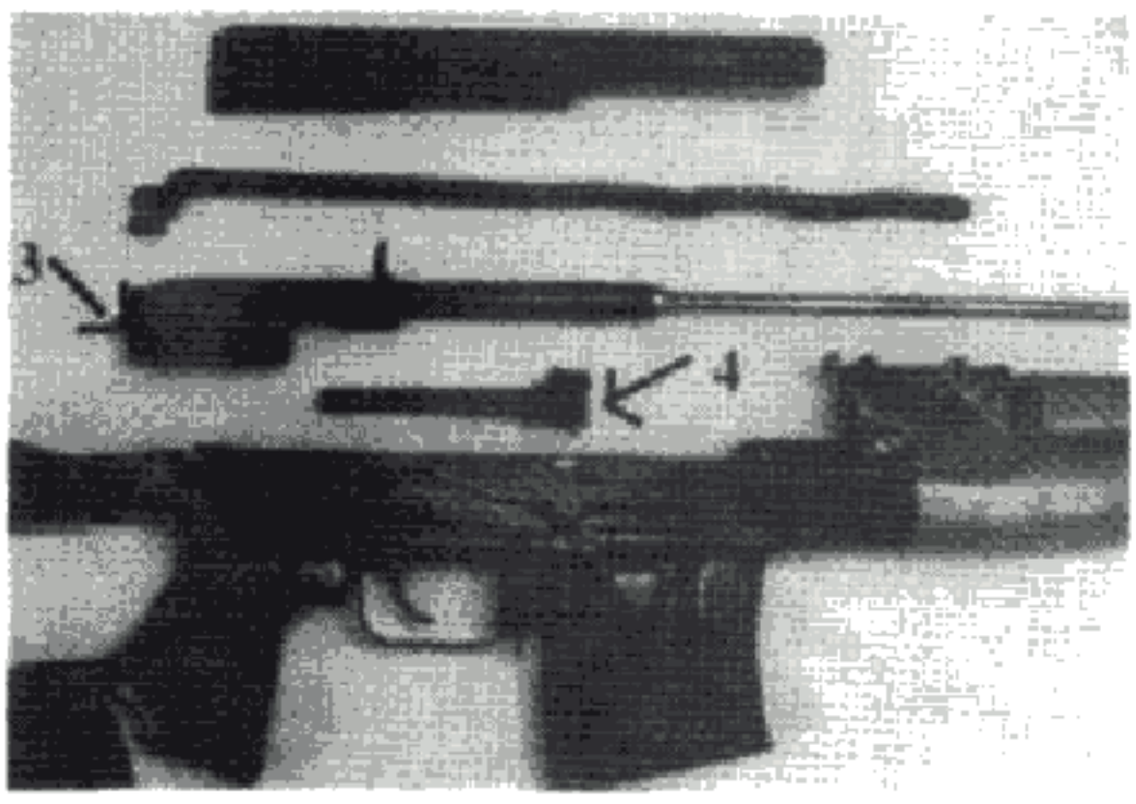
Loading & Operation

Loading Your Dragunov

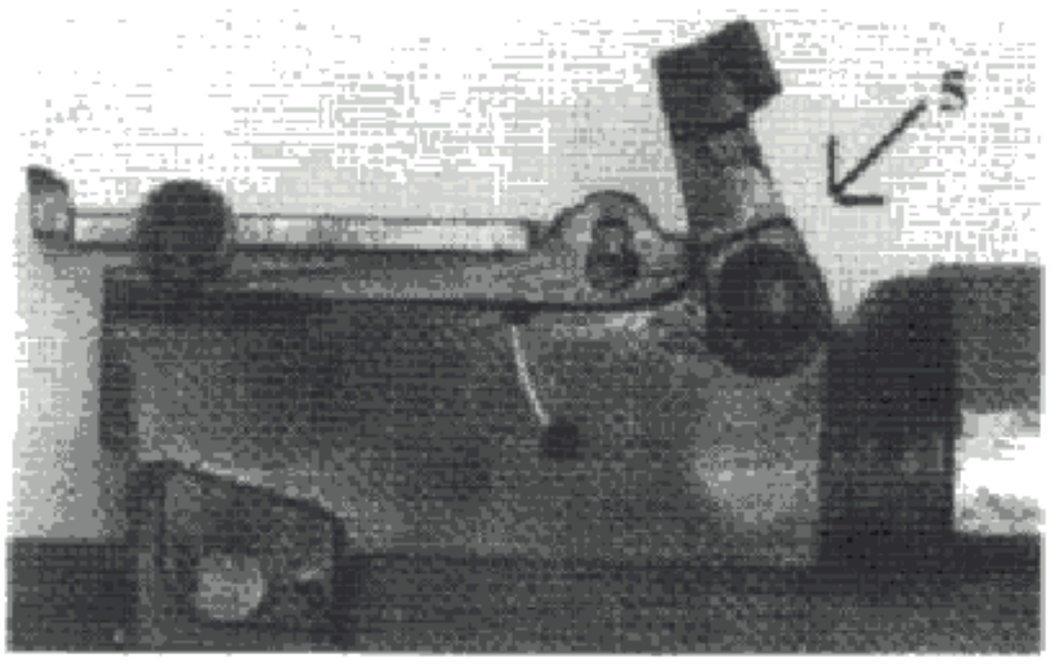
1. Place bullet in the center of the magazine and depress downward (Repeat until the mag is full).
2. When the mag is loaded, (keeping the weapon pointed in a safe direction) place the front lip of your mag into the weapon until you feel it catch, then rotate the mag to the rear until the mag catch locks the mag into place.
3. While holding the firearm in a safe direction and all fingers away from the trigger, loop your finger over the bolt handle and firmly pull to the rear of the weapon until it can't go any further and then release it.
4. You have now chambered a round. Place your safety lever to the upper most position.
5. When you are ready to fire and you are sure of your target and what's behind it, drop your safety lever to the lower most position.
6. Aim at your target and pull the trigger.
   Please Note: Once the trigger is pulled, the bullet is going out of the barrel. Nothing will bring it back.
   PLEASE BE SURE OF YOUR TARGET.
7. To unload your weapon, start by removing the loaded magazine. Then pull the bolt handle back and look into the chamber. A good habit would be to pull the bolt at least 2 times, just to be sure.

Disassembling the Romanian Dragunov

1. Make sure that the weapon is **unloaded**!
2. Press in on Recoil Assembly Button (Figure 1).
3. Pull upward and remove the Receiver Cover (Figure 2).
4. Push Recoil Spring button in until it is clear of the catch, then remove to the rear.



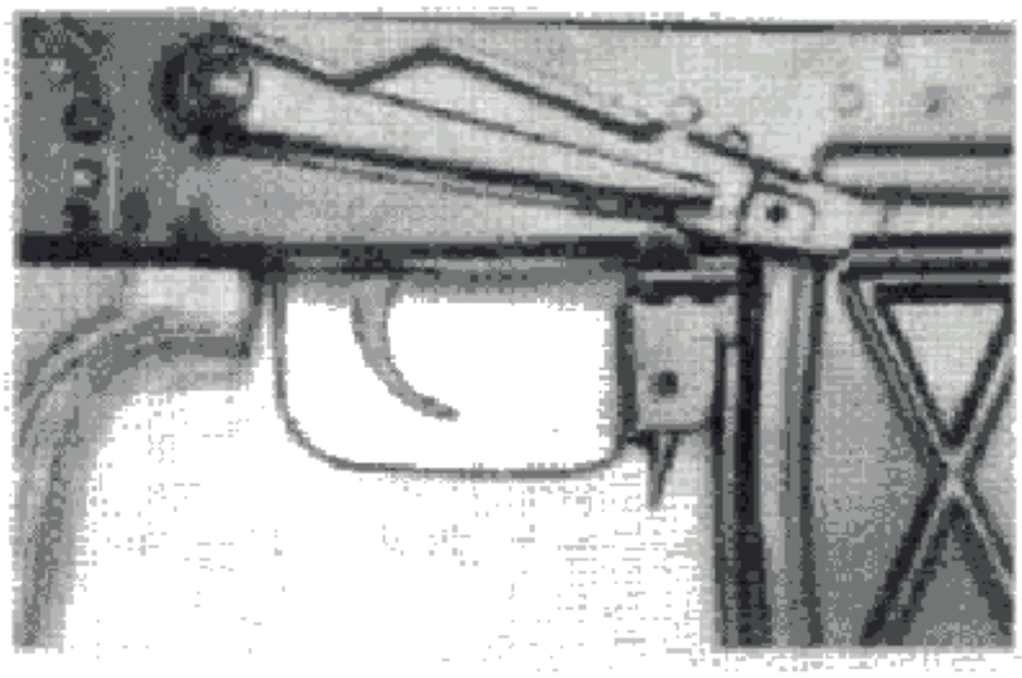
5. Pull bolt Assembly to the rear and then lift up and back it out of the gas tube (Figure 3).
6. Slide bolt (Figure 4) to the rear of the bolt carrier, turn left to clear rotating lock, then slide out of the carrier to the front.



7. Raise Gas Tube Lever (Figure 5), located on the right side of the weapon below the rear sight.
8. Lift the Gas Tube (Figure 6) up and to the rear.

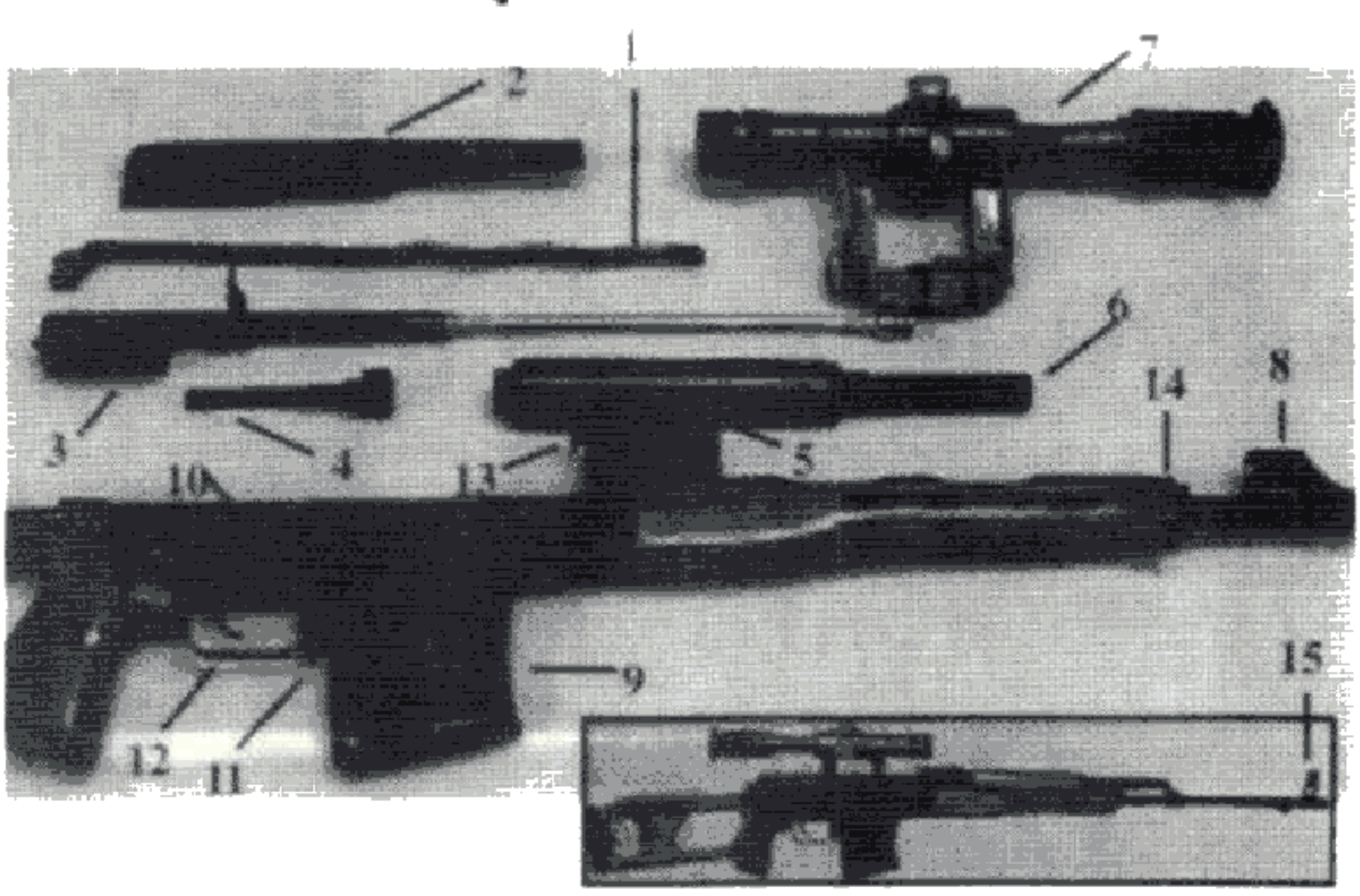
Your weapon is now disassembled as far as it should need to be for regular cleaning. Any further disassembly should be done by a skilled professional.

Safety Lever Operation



The Safety Lever on your Romak-3 is the same design as the standard AK-47. Simply slide the lever to the upper most position and it locks the trigger mechanism and also blocks the bolt from chambering a round. Slide the lever to the lower position to fire the weapon. *Note: Never completely rely on your weapon's safety. Always keep your weapon pointed in a safe direction.*

Exploded View



1. Recoil Spring Assembly
2. Receiver Cover
3. Bolt Carrier w/Piston
4. Bolt
5. Gas Tube Lever
6. Gas Tube
7. PSO-1 Scope
8. Gas Port
9. 10 RD Mag
10. Safety Lever
11. Mag Release
12. Trigger
13. Rear Sight
14. Forearm Stock Release Lever
15. Front Sight Assembly

You have just purchased a gun that is capable of shooting great distances. Please be responsible in this era of "blame the gun, not the shooter". If you ever want your children or grandchildren to know the freedom of gun ownership, it rests in your hands.

YOU ARE RESPONSIBLE FOR YOUR ACTIONS!

HANDLE SAFELY & WITH CARE!

Always keep your firearms locked up & out of reach of children & other unauthorized individuals.

TECHNICAL DATA

Romanian Dragunov Sniper Rifle

Caliber (mm)	7.62x54mm
Length (mm)	
Weapon	1,150
Barrel	625
Weight (kg/without site)	
Weapon	4.06
Empty Magazine (10Rd)	0.1
Loaded Magazine (10Rd)	0.318
Rifling	4x570mm
Surveyor's pole line (mm)	590
Rate of fire (RPM)	
Theoretical	30
Practical	8-10
Firing range by using rear sight (m)	1,200
Firing range by using telescope (m)	1,300
Bullet Speed (m/s)	830
Effective Range (m)	1,000
Maximum Range (m)	3,000
Ammunition Type	7.62x54mm
Magazine Capacity	5/10 Rds
Sight	
Field of view	6
Magnification	4x
Graduated Range (m)	800
Weight (kg)	0.65

- *Attractive Laminated Wood Stock*
- *4x Illuminated Scope w/ Battery*
- *Factory Installed Compensator*
- *Trigger Lock w/2 Keys*
- *Cleaning Kit & Sling Included*

7.62-mm SVD
DRAGUNOV SNIPER
RIFLE

TECHNICAL DESCRIPTION
AND SERVICE MANUAL

Adapted to PDF format by:

hootbro@idworld.net

Rev 1.03
August 4, 1999

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INTRODUCTION

Technical Description and Service Manual of the 7. 62-mm Dragunov sniper rifle (SVD) is intended for studying the rifles and optical sights and keeping them in constant fighting ready for action.

This paper includes specifications and data of the rifle and optical sight design and operation, as well as main rules necessary to provide for the proper maintenance of the rifle with the sight and full using of their technical capabilities.

Since efforts are continuously made to improve the rifle and its completing articles, minor changes in the Technical Description may be introduced without special notice.

1. TECHNICAL DESCRIPTION

1.1. Purpose of rifle

1.1.1. The 7. 62-mm Dragunov sniper rifle is a sniper's weapon and is designed to destroy various single targets, which may be collapsible, moving, open and screened (Fig. 1).

The sniper optical sight is intended for precise aiming of the sniper rifle at various targets.

Fig. 1. 7.62-mm Dragunov sniper rifle with optical sight and knife bayonet:

1 - 7.62-mm Dragunov sniper rifle;
2 - sniper optical sight PSO-1;
3 - knife bayonet.

1.1.2. The sniper rifle uses rifle cartridges with ordinary, tracer and armor-piercing-incendiary bullets or rifle sniper cartridges. The fire is delivered in single shots.

1.1.3. The optical sight permits to conduct night firing at infrared sources and under bad conditions of illumination, when it is difficult to fire at targets with the open sight.

When observing the infrared sources, the rays radiated by the source pass through the sight objective and effect the screen, located in the focal plane of the objective lens.

In place of acting the infrared rays luminescence appears on the screen. It results in a visible source image in the form of a round greenish spot.

1.2. Technical data

1.2.1. For basic ballistic and design characteristics of the rifle and the rifle cartridge and for design data of the optical sight refer to Table No. 1.

Table No. 1

Characteristics	Nominal Value
1. Caliber, mm	7.62 x 54R
2. Number of grooves	4
3. Sighting Range, m: with optical sight with open sight	 1300 1200
4. Muzzle velocity, m/sec	830
5. Killing range, m	3800
6. Mass of rifle without knife bayonet, with optical sight, empty magazine and cheek plate, kg	4.3
7. Magazine capacity, cartridges	10
8. Length of rifle, mm: without knife bayonet with adjoined knife bayonet	 1220 1370
9. Mass of cartridge, g	21.8
10. Mass of ordinary bullet with steel core, g	9.6
11. Mass of powder charge, g	3.1
12. Optical sight magnification	4-fold
13. Field of sight vision, degree	6
14. Diameter of pupil, mm	6
15. Eye relief, mm	68.2
16. Resolution, second	12
17. Length of sight with eye shield and advanced blind, mm	375
18. Sight width, mm	70
19. Sight height, mm	132
20. Mass of sight, g	616
21. Mass of sight with SPTA set and slip cover, g	926

1.3. Rifle components

1.3.1. The set of the sniper rifle includes (Fig. 1):

- sight PSO-1 - 1 pc.;
- knife bayonet - 1 pc.;
- carrier for a sight and magazines (Fig. 3) - 1 pc.;
- bag for SPTA (Fig. 4) - 1 pc.;
- sling for carrying small arms (Fig. 5) - 1 pc.;

1.3.2. The sniper optical sight is delivered complete with a slip cover (Fig. 6) and individual SPTA set (Fig. 11).

1.4. Design and operation of rifle

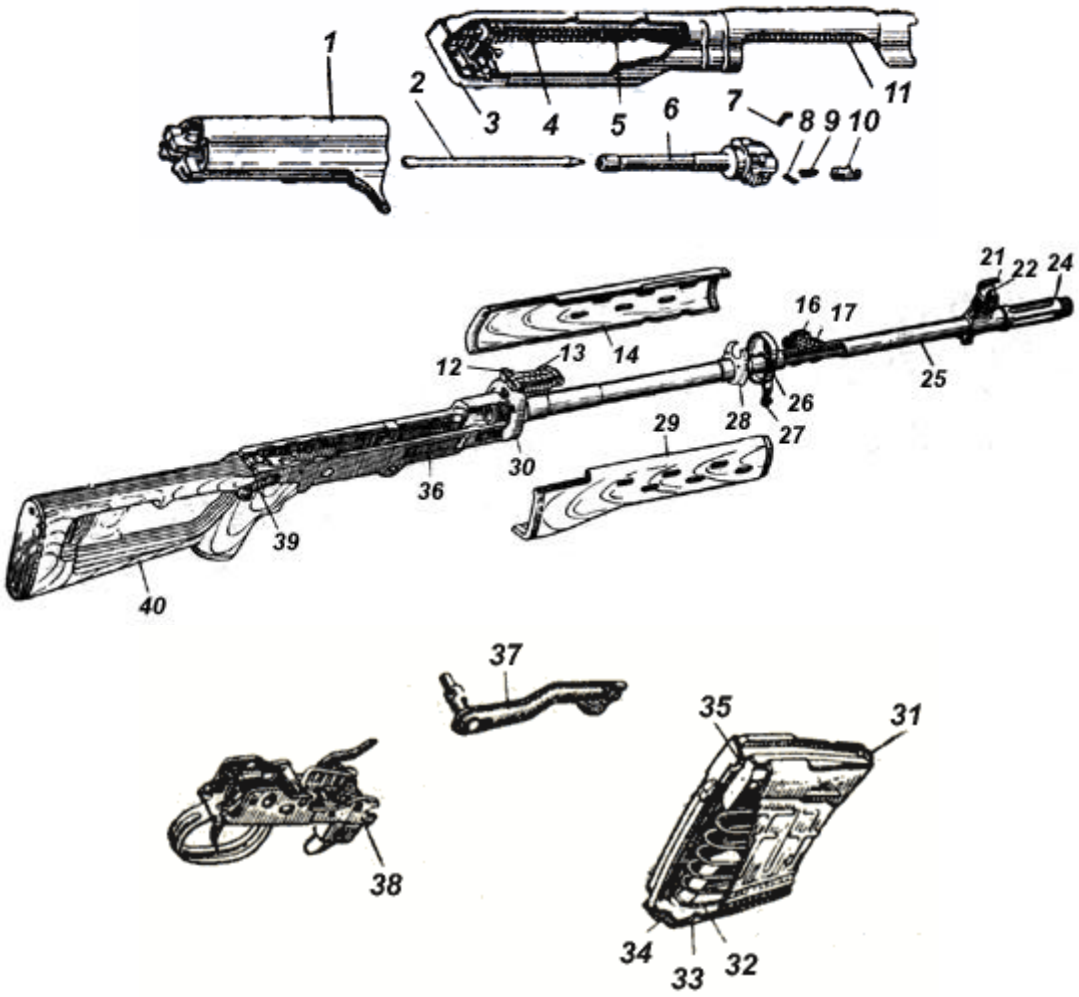


Fig. 2. 7.62-mm Dragunov sniper rifle:

Fig. 2. 7.62-mm Dragunov sniper rifle continued:
1 - bolt support; 2 - firing pin; 3 - cover; 4- guiding rod; 5 - guiding bushing; 6 - bolt; 7 - extractor pin; 8 - firing pin stud; 9 - extractor spring; 10 - extractor; 11 - return spring; 12 - sight leaf slide; 13 - sight leaf; 14 - hand guard, L.H. ; 15 - pusher spring; 16 - gas tube latch; 17 - gas chamber; 18 - gas piston; 19 – gas tube 6B1; 20 - gas regulator; 21 - front sight body; 22 - front; 23 - pusher; 24 - front sight base; 25 - barrel; 26 - upper band, assembly; 27 - band axle pin; 28 - oil seal, assembly; 29 - hand guard, R. H. ; 30 - upper band with spring; 31 - magazine body, assembly; 32 - magazine spring; 33 - magazine cover; 34 - sight leaf, assembly; 35 - follower; 36 - receiver; 37 - accidental shot safety device; 38 - firing and trigger mechanism; 39 - cover axle pin; 40 – butt assembly.

1.4.1. The sniper rifle consists of the following main parts and mechanisms (Fig. 2):

- barrel with receiver;
- bolt with bolt support;
- safety lever, assembly;
- firing and trigger mechanism;
- cover with retracting mechanism;
- magazine;
- butt;
- upper band, assembly;
- hand guard, L.H., assembly;
- hand guard, R.H., assembly;
- sight leaf, assembly;
- front-sight base and body, assembly.

1.4.2. The sniper rifle is a self-loading weapon. The reloading of the rifle is based on utilizing the energy of powder gases which arc channeled from the barrel bore to the gas piston.

Upon firing, a certain amount of the powder gases following the bullet flows through the port in the barrel bore wall into the gas chamber, exerts pressure upon the front wall of the gas piston and throws back the piston with pusher and, consequently, the bolt support into the rearward position.

As the bolt support travels rearward, the bolt opens the barrel bore, the cartridge case gets removed from the cartridge chamber and ejected out of the receiver. The bolt support compresses the return springs and cocks the hammer; i. e. engages it with the auto-safety cocking cam.

The bolt support and the bolt return to the front position under the action of the retracting mechanism; as a result, the bolt feeds the next cartridge from the magazine into the cartridge chamber and closes the barrel bore, while the bolt support disengages the auto-safety sear from the hammer. The hammer gets cocked. The bolt gets locked, after it has been turned to the left and its locking lugs engaged with recesses of the receiver.

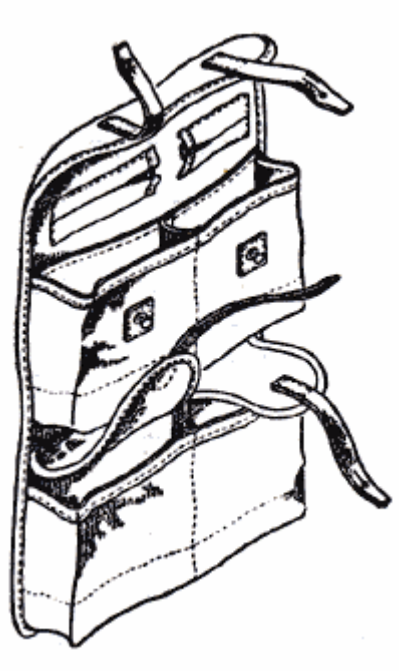


Fig. 3. Carrier for optical sight and magazines.

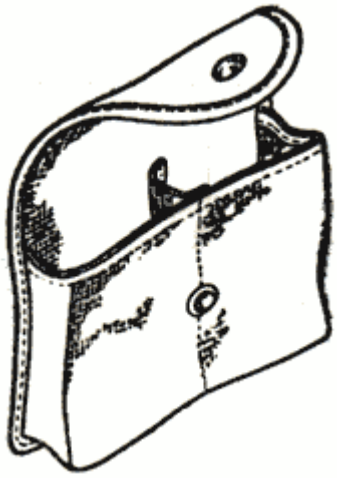


Fig. 4. Bag for SPTA.

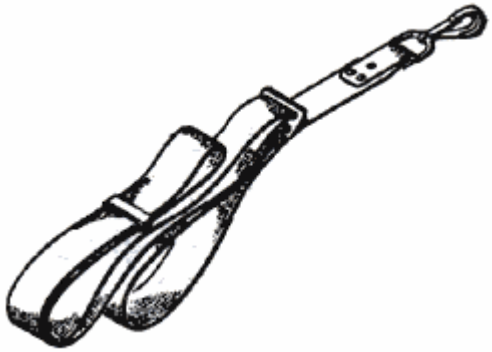


Fig. 5. Sling for carrying small arms.

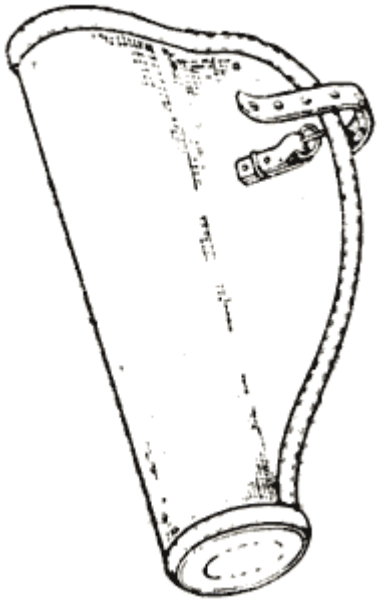


Fig. 6. Slip cover for sight.

To fire a shot, it is necessary to release the trigger and press it anew. After the trigger has been released, the rod moves forward and its hook engages the sear and, if pressed, the rod hook turns the sear and disengages it from the hammer-cocking cam.

The hammer actuated by the mainspring turns round its pin and strikes the firing pin. The latter travels forward and impinges the primer. Thus, a shot is fired.

With the last cartridge fired and the bolt returned to the rearward position, the magazine follower lifts the bolt catch; the latter engages the bolt to stop the bolt support in the rearward position. Thus, it is necessary to load the rifle anew.

The rifle has a gas regulator, which serves to change recoil speeds of moving parts. Under conditions of proper servicing with the parts lubricated, the gas regulator is set at division 1. On firing during a long time without cleaning and lubricating and heavy soiling of the rifle, stoppage may occur š incomplete recoil of the moving parts. In this case the regulator is set at division 2. To change the regulator from one position to another use the rim of the cartridge case or the cartridge.

1.5. Design and operation of sight and its component parts

1.5.1. The sniper optical sight PSO-1 (Fig. 7) consists of the following main parts:

- body;
- objective;
- eyepiece;
- blind;
- eye shield;
- knob with the scale of sight angles;
- knob with the scale of deflection corrections;
- handle;
- colored glass;
- guide;
- supply source;
- lamp;
- cap.

The objective in a mount with a collapsible blind is screwed into the body. The eyepiece in assembly with the eye shield is screwed into the body from another end.

On the top of the body is a knob with a sight angle scale plotted on its cylindrical portion. Inscriptions "BBepx" š "Upward", "BHN3" š "Downward", "CTn" š "MPI" and arrows, indicating the direction of the knob rotation when adjusting the sight are plotted on the knob nut.

The sight angle scale is provided with ten divisions (from 0 to 10).

The value of the scale division equals to 100 m. Beginning from division 3 it is possible to set sight angles every 50 m using the knob retainer.

On the right side of the body there is a knob with the scale of deflection corrections. The cylindrical portion of the knob is provided with 21 divisions (from 0 to 10 in both directions).

Dash lines and digits located to the right from 0 are of a black color, and those located to the left from 0 are of a red color.

The value of the scale division equals to 0š01. Deflection corrections may be set every 0-00.5 by means of the knob retainer.

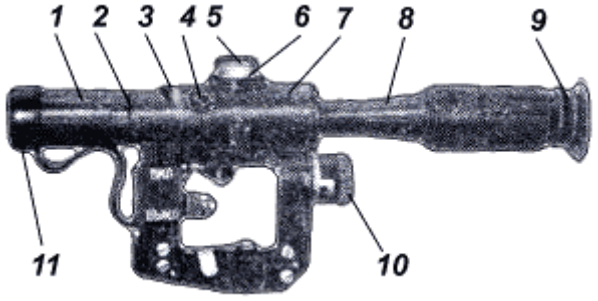


Fig. 7. Sight PSO-1:
1 - blind; 2 - objective; 3 - colored glass; 4 - handle; 5 - nut; 6 - knob; 7 - body; 8 - eyepiece; 9 - eye shield; 10 - cap; 11 – cap

Inscriptions "BnpaBo - To the Right", "BJieBo - To the Left", "CTn - MPI" and arrows, indicating the direction of rotation, when adjusting the sight are plotted on the nut fastening the knob of the deflection correction mechanism.

The band of the sight angle knob, as well as the band of the deflection correction knob each bears 60 divisions. The value of one division equals 0-00.5. Divisions on knob bands serve for reading the correction when adjusting the sight on the rifle.

The power source of the illuminating lamp is located in the seat of the body. The seat is covered with a cap.

1.5.2. The sight optical system is designed for obtaining images of objects located on the terrain and represents the monocular telescopic system with permanent magnification.

The optical system (Fig. 8) consists of objective lenses, reticle, reversing system, eyepiece lenses, screen, colored glass, light-orange glass and protective glass.

The objective is designed for obtaining the image of the observed object. In an objective focal plane an image is obtained reversed from the left to the right and from the top to the bottom.

The reversing system is intended to obtain the real correct image.

The eyepiece serves to inspect an observed image and reticle.

The light-orange colored glass improves contrast of an image in a dull weather.

The reticle represents a flat-parallel plate. The plate is provided with the scales of sight angles and deflection corrections as well as a range-finding scale. The field of vision view is shown in (Fig. 9).

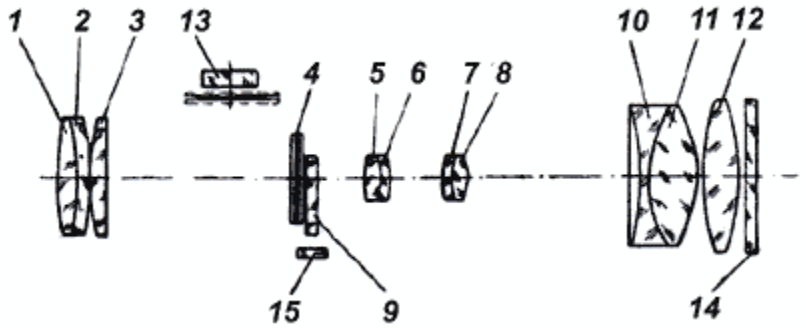


Fig. 8. Optical scheme:
1, 2 - objective lenses; 3 - welded screen; 4 - reticle; 5, 6 - lenses (relay-lens); 7, 8 - eyepiece lenses; 9 - light-orange colored glass; 10 - colored glass; 11 - protective glass

The sight angle scale represents a number of angle marks up to the range of 1300 m. When setting the sight angle knob scale at division 10, the peak of the second from the top angle mark will correspond to the range of 1100 m, the peak of the third angle mark š to 1200 m, the peak of the forth angle mark š to 1300 m.

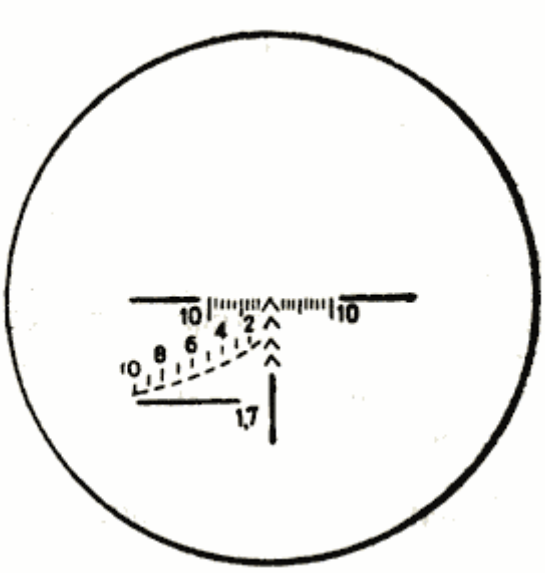


Fig. 9. Field of vision view:

Plotted to the left and to the right from the angle marks is the scale of deflection corrections. The value of each division is 0-01.

The values of deflection corrections 0-05 and 0-10 are marked out by an elongated dash line.

The value of deflection correction 0-10 is marked out by an elongated dash line and designated by a digit 10. Two horizontal dash lines are plotted from the right and from the left of the deflection correction scale. The range-finding scale located from the left under the deflection correction scale serves for detecting the range up to the target. The range-finding scale represents two lines. The upper (curve) line is calculated for a target 1.7 m in height and is marked with digits 2, 4, 6, 8 and 10.

The sight reticle is displaced in two directions, which are perpendicular to each other, but it is always remains in an objective focal plane.

** Note. It is possible to complete the rifle with the sight of PSO-1Ì2 make without the screen, colored glass and handle.*

1.6. Sniper rifle accessories

1.6.1. The sniper rifle accessories (Fig. 10) are used in disassembling, cleaning and lubricating the sniper rifle and are carried in the bag intended for the sight and magazines.

1.6.2. The set of accessories includes: a cheek plate, a cleaning rod, a scourer, a bristle brush, a screwdriver, a drift, a container and an oiler.

THE CHEEK PLATE is used when firing the rifle with the optical sight. In this case it is put on the rifle butt and fixed on the latter by means of the lock.

THE CLEANING ROD is used to clean and lubricate the barrel bore, passages and cavities of other parts of the rifle. The cleaning rod consists of three sections screwed to one another.

THE SCOURER is used for cleaning and lubricating the barrel bore as well as the passages and cavities of other rifle parts.

THE BRISTLE BRUSH is intended for cleaning the barrel bore with the RCHS solution.
THE SCREWDRIVER is used in disassembling, assembling the rifle and in cleaning the gas chamber and the gas tube. It is also used as a wrench to adjust the front sight position in height.
THE DRIFT is used for driving the pins and studs out.
THE ACCESSORIES CONTAINER houses the scourer, the bristle brush, the screwdriver and the drift. It consists of two component parts: a container-wrench and a cover.

The container-wrench is used as a handle of the cleaning rod, when cleaning and lubricating the rifle and as a handle of the screwdriver when disassembling and assembling the rifle, and as a wrench when detaching the gas tube and assembling the cleaning rod.
THE CONTAINER COVER is used as a muzzle protector in cleaning the barrel.
THE OILER is used for storage of the lubricant.

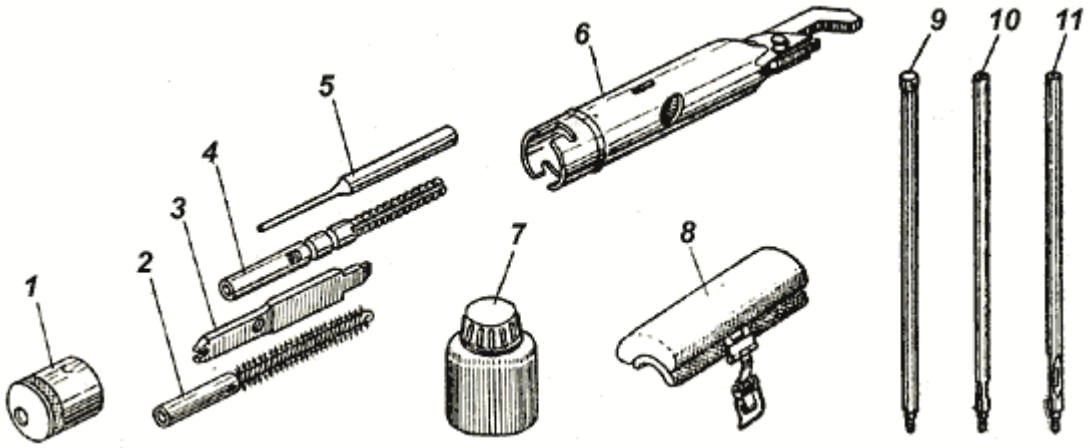


Fig. 10. Accessories to rifle:
1 - container cover; 2 - bristle brush; 3 - screwdriver; 4 - scourer; 5 - drift; 6 -container body; 7 - oiler; 8 - cheek plate; 9 - cleaning rod; 10 - cleaning rod extender; 11 - cleaning rod extender, front

1.7. Individual SPTA set to sight

1.7.1. Individual SPTA set (Fig. 11) serves for providing normal functioning of the sight and replacement of separate failed parts.
1.7.2. Individual SPTA set includes: illuminating system, colored glass, wrench, napkin, supply sources, (sections 2RC63), lamps (in cassette) and a cap.
**** Notes.** 1. One of the sections is placed into the sight. 2. The napkin is not shown conventionally.*

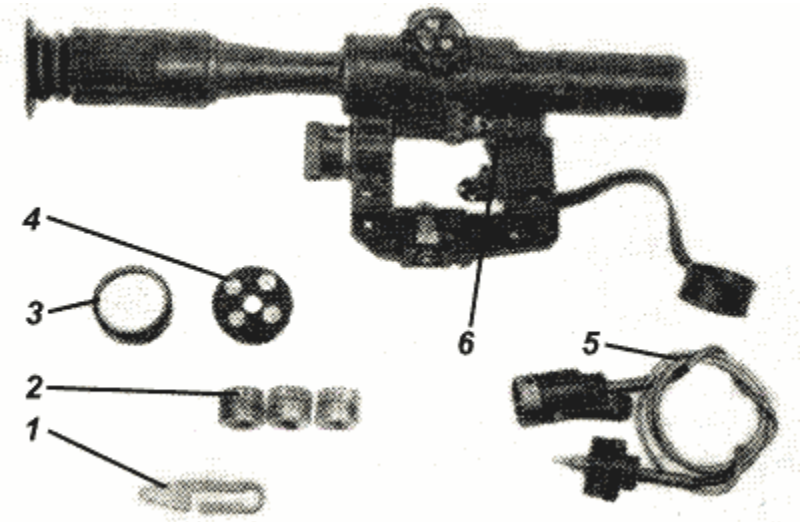


Fig. 11. Sight PSO-1 with individual SPTA set:
1 - wrench; 2 - sections of mercury-zinc cells 2RC63; 3 - colored glass; 4 - lamps CM 2.5-0.075 (in cassette); 5 - cap; 6 - illuminating system

The illuminating system is intended for lighting the reticle when working with the sight at the environmental temperature below 0 grad. Ñ. The wrench serves for screwing the reticle-illuminating lamp in and out. The napkin is intended for cleaning optical parts. Supply source, lamps and a cap are delivered as spare parts.

1.8. Tare and packing

1.8.1. The sniper rifles are supplied to the Customer in wooden chests painted in khaki color. In each chest six sniper rifles with all completing articles are placed and fastened with special inserts.
1.8.2. The chest is composed of two compartments separated with a wooden partition. The bottom as well as all walls of the chest are covered with paraffined paper. Prior to packing, the bottom and walls of the large compartment of the chest are additionally covered with inhibited paper. The small compartment of the chest is not covered with inhibited paper. The optical sights and slings for carrying small arms which are packed in this compartment are wrapped only with paraffined paper.

2. SERVICE MANUAL

2.1. General

The sniper rifle and optical sight should be kept in good repair and in a ready-for use condition, which can be obtained by timely and skilful cleaning and lubricating, careful handling, proper storage, timely technical inspection and remedying of the troubles.

2.2. Safety precautions

2.2.1. To carry out training in disassembly and assembly of the rifle use blank rifles only. Training with service rifles is allowed only in exceptional cases keeping particular care when handling parts and mechanisms.

2.2.2. Prior to preparing the rifle for firing and also prior to its cleaning and lubricating be sure that it is not loaded. During firing practice with the loaded rifle never direct the rifle to people or domestic animals.

Firing practice is carried out in the closed shooting gallery only when the suction-and-exhaust ventilation is provided there, because powder gases, liberated when shooting, are toxic. On finishing the fire unload the rifle and set it at safe.

2.3. Preparing of sniper rifle and optical sight for firing

2.3.1. Preparation of the sniper rifle and the sight for firing is accomplished with a view to ensure their trouble-free operation during firing.

To prepare the rifle and the sight for firing, proceed as follows:

a) clean the rifle;
b) inspect the disassembled rifle and lubricate it;
c) inspect the assembled rifle and sight;
d) check the rifle mechanisms and parts for proper interaction;
e) check the illuminating system and reticle illuminating set for sound condition;
f) check the sight angle and deflection correction mechanisms for proper operation;
g) check the screen of the sight PSO-1 for switching in and off;
h) activate the sight PSO-1 screen.

Directly before firing, wipe dry the barrel bore (the rifled portion and the cartridge chamber), inspect the cartridges and load the magazine with them.

For the process of activating set the screen switching lever into position along the sight axis, put the sight in such a position in which the whole surface of the light filter is exposed to the light source, radiating ultraviolet rays.

The reactivating time, when the screen is lit with daily scattered light, will be equal to 15 minutes, when lit with straight sun rays or with rays irradiated by an electric lamp (100š200W) at a distance of 20 cm, it will be within 7š10 minutes. Reactivation of the screen for a more longer period of time than indicated one does not increase its sensibility. Useful life of a reactivated screen is 6 - 7 days, after this period reactivation should be repeated. One reactivation is sufficient for the sight operation during 3 days (at 8-hours operation in a day).

2.4. Zeroing of rifle and procedure of optical sight operation

2.4.1. The sniper rifle being in the service of a subunit should be zeroed. The necessity of rifle zeroing is determined by test firing.

Rifles are subjected to test firing:

a) on reception of the rifle by the subunit;

b) after the rifle parts repair or replacement, which may affect the rifle fire accuracy;

c) in case of excessive deviation of the mean point of impact (MPI), or bullet dispersion, which does not meet the accuracy requirements. Under combat conditions the rifle accuracy should be tested periodically whenever the situation permits.

2.4.2. The sniper rifle is test-fired by four shots, aiming thoroughly and uniformly with the aid of the open sight. Fire is conducted at the black rectangle, 20 cm wide and 30 cm high, secured on a white board, 1 m high and 0.5 m wide. The point of aim is the middle of the black rectangle bottom edge. During firing when the open sight is used the normal position of the MPI is marked with chalk or a colored pencil by the plumb line, 16 cm above the point of aim. This point serves as the check point (CP).

The range is 100 m; the sight is set at 3. Firing is conducted from the prone position with support. To test-fire and zero a rifle, use should be made of cartridges with ordinary bullets having a steel core. Fire is conducted with knife bayonet removed. Upon firing the shots, examine the target and arrangement of hits; determine accuracy of fire and position of the MPI. The sniper rifle fire accuracy is considered normal, if all the four hits are arranged within the circle, 8 mm in diameter.

If the shot group does not meet the requirements, test firing is repeated.

If the second test results are unsatisfactory, the sniper rifle should be sent to the repair shop.

If the shot group is found normal, determine the MPI and its position relative to the check point.

Determination of the mean point of impact is shown in Fig. 12. The sniper rifle fire accuracy is considered normal, if the mean point of impact coincides with the check point or deviates from it in any direction by no more than 5 cm.

2.4.3. If during test-firing the MPI deviates by more than 5 cm from the CP in any direction, the position of the front sight (as to its height) or that of its body (as to side position) should be changed accordingly. If the mean point of impact is below the check point, the front sight should be screwed in, if it is above the check point, the front sight should be screwed out.

If the MPI is to the left of the CP, the front sight body should be shifted to the left, if to the right, shift the body to the right. The front sight body displacement by 1 mm to the side and one complete revolution of the front sight (when screwed in or out) will change the position of the mean point of impact by 16 cm when fire is delivered at a range of 100 m.

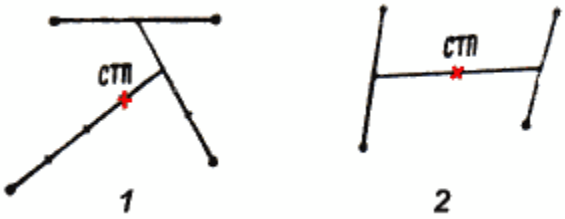


Fig. 12. Determination of mean point of impact (MPI):
1 - by consequent division of lines; 2 - with symmetrical arrangement of hits. CTn means MPI

Repeat test-firing to make sure that the above displacement of the front sight and its body is properly done.

After the sniper rifle has been zeroed, remove the old notch and make a new notch on the front-sight body.

2.4.4. To zero the rifle with the optical sight attach it to the rifle and put the cheek plate on the butt. Rotate the knobs to set the sight angle knob at division 3 and deflection correction knob at 0. Perform the test firing with the aid of the optical sight, the conditions being the same as for test firing of the rifle with the aid of the open sight, but the check point in this case is marked at a height of 14 cm from the point of aim.

If, as a result of the test-firing, all four hits are arranged in a circle, 8 cm in diameter, but the mean point of impact deviates from the check point by more than 3 cm, determine the deviation of the MPI and introduce the appropriate corrections into the settings of the nuts on knobs of the sight angles and deflection corrections.

Displacement of the nuts by one division relative to the scales on the bands of the knobs in firing at 100-m range will change the position of MPI by 5 cm. To introduce corrections release screws on the knob ends by 1š1 1/2 turns and while rotating the sight angle nut and the deflection correction nut, manually, displace them by a necessary amount and tighten the screws.

After the corrections have been introduced in the knob setting, repeat the test firing. If, as a result of the repeated test-firing, all the four hits are arranged in a circle, dia. 8 cm, the MPI has matched with the check point or deviated from it to either side by no more than 3 cm, the rifle is considered zeroed.

After zeroing the rifle, record the position of the MPI in the *Service Log*.

2.4.5. To detect the range up to the target proceed as follows:

Match the target image with the range-finding scale of the reticle so that the target base is on the horizontal line of the range-finding scale, and the target top point touches the upper (dotted) line of the scale without clearance.

Take off the range-finding scale readings in the point of touching the target.

A digit which happens to be in the point of touching determines the distance up to the target (in Fig. 13 the distance up to the target is 400 m).

2.4.6. To deliver firing at night or in twilight turn the micro-tumbler lever to the position "BKJi" (ON).

Sight angles and deflection correction angles are set in this case by counting clicks of the retainer from zero position. Bear in mind that the fixation of the sight angle knob is performed from "0" to "3" every whole division, i.e. every 100 m and further on till setting 10 every half-division i.e. every 50 m. The fixation of the knob of deflection corrections is effected every half division, i.e. every 0-00.5.

2.4.7. When working with the illuminating system it is necessary to store the set body with the section 2 RC-63 in a warm place (in the pocket of a field shirt or a sniper's overcoat.

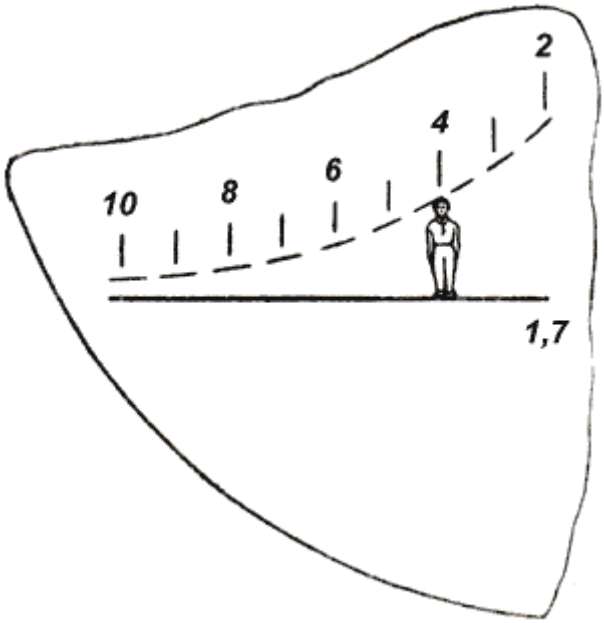


Fig. 13. Range-finding scale

2.5. Technical condition inspection, troubles and remedies

2.5.1. To check the rifle for good condition, as well at to set its further ready-for-use condition periodically inspect the rifle.

During inspection make sure that all the rifle parts are present and the external parts are free of rust, dirt, dents, scratches, nicks, chipping and other damage, since they may interfere with the normal operation of the rifle mechanisms and the optical sight.

Besides, check condition of the lubricant on the rifle parts visible without disassembling the rifle. Make sure that the magazines, the knife bayonet, the accessories, the slip cover for the optical sight, the carrier for the optical sight and magazines, as well as the bag for SPTA are not missed, make sure that there is no foreign matter in the barrel bore.

Check the parts and mechanisms for proper operation. When checking the operation of the rifle parts and mechanisms, release safety lock, retract the bolt support by the reloading handle all the way back and release it; the bolt support should be stopped in the rear position by the bolt catch.

Detach the magazine, slightly retract the bolt support by the handle and release it; the bolt support should energetically return to the front position. Set the rifle at safe and press the trigger; the trigger should not move rearward completely, and the hammer should remain cocked.

Release safety lock and press the trigger; a click should be heard, which is indicative of the energetic blow delivered by the hammer against the firing pin.

Set the rifle at safe again and attach the magazine; the bolt support should not move backward, the safety lock should be reliably retained in the required position.

Check the feed of cartridges into the cartridge chamber, extraction and ejection of fired cases (cartridges). Fill the magazine with dummy cartridges, attach it to the rifle, and without pressing the magazine latch, try to detach the magazine with the effort of the hand, the magazine should freely enter the opening of the receiver and should be securely retained by the magazine latch.

Reload the rifle several times, the dummy cartridges should be fed, without any delay, from the magazine into the cartridge chamber and rushly extracted from the receiver outward.

When checking the condition of the optical sight, make sure that the objective and eyepiece lenses are not broken. Check to see that the knobs rotate smoothly and are reliably fixed in the required position, they are free of play; the sight is free of play and the clamping screw reliably secures the sight on the rifle; the reticle illuminating set is in sound condition; to this end, fit the cap onto the objective, switch on the tumbler switch and look into the eyepiece (if the illuminating set is in good repair, the reticle is seen distinctly; if the reticle is not seen, replace the cell or the electric lamp).

If the sight is not free of play or the handle-guiding lug does not enter the recess in the bracket, with the sight reliably secured on the rifle, adjust the clamping screw.

To this end, detach the sight from the rifle, press the slide to the handle (compress the spring) and screw the clamping screw adjusting nut in or out.

Inspect cartridges before firing. When inspecting the cartridges, make sure that the cartridge cases are not bent and free of rust, the bullet does not play in the cartridge case mouth; the primer is free of verdigris and cracks, no setback of the primer occurs; are there some dummy cartridges among live cartridges or not. All the defective cartridges are to be transferred to the depot.

2.5.2. All defects of the rifle, the optical sight, magazines and accessories should be immediately eliminated. If there is no opportunity to eliminate the troubles in the subunit, transfer the rifle (the optical sight, magazines, accessories) to the repair shop.

2.5.3. Careful handling the rifle and proper care of it provide reliable, trouble-free operation and long service life of sniper rifle parts and mechanisms. However, in case of clogging and wear of rifle parts and mechanisms and in case of careless handling the rifle or in case of cartridges damage, stoppages in fire may occur.

If during firing stoppages occur, reload the rifle, for which purpose energetically retract the bolt support by the handle, release it and proceed with firing.

If the stoppage is not eliminated, determine the cause of the trouble and eliminate the stoppage as instructed in the Table No. 2.

Table No. 2

Trouble	Cause	Remedy
Cartridge not fed into chamber. Bolt in front position, but no shot fired (no cartridge in cartridge chamber)	Dirty or faulty magazine. Faulty magazine latch	Reload the rifle and proceed with firing. Replace the magazine, if stoppage is repeated. Transfer the rifle to the repair shop, if the magazine latch is faulty
Misalignment of cartridge. Cartridge with its bullet rests on barrel breech face, moving parts stop in middle position	Bent guiding lugs of magazine side walls	Holding the bolt support reloading handle, remove the misaligned cartridge and proceed with firing. If the stoppage is repeated, replace the magazine..
Misfire. Bolt in front position, cartridge in cartridge chamber, hammer released, no shot fired	Faulty cartridge. Faulty firing pin or firing and trigger mechanism, dirty or thick lubricant	Reload the rifle and proceed with firing. If stoppage is repeated, inspect and clean the firing pin and the firing and trigger mechanism; if they are broken or worn, transfer the rifle to the repair shop
Fired case fails to be extracted. Fired case in cartridge chamber, the next cartridge with its bullet rests on fired case, moving parts are in middle position	Dirty cartridge or dirty cartridge chamber. Dirty or faulty extractor or its spring	Retract the bolt support reloading handle, and holding it in the rear position, detach the magazine and remove the misaligned cartridge. Extract the fired case by the bolt or by the cleaning rod and proceed with firing. If the stoppage is repeated, clean the cartridge chamber. Inspect and clean the extractor, then proceed with firing. If the extractor is faulty, transfer the rifle to the repair shop

Table No. 2 continued:

Trouble	Cause	Remedy
Fired case stuck or fails to be ejected. Fired case is not ejected from receiver, it is in the receiver, in front of bolt or rammed by the bolt into cartridge chamber again	Dirty friction parts, gas passages or cartridge chamber Dirty or faulty extractor	Retract the bolt support reloading handle, remove the fired case and proceed with firing. If the stoppage is repeated, clean the gas passages, the friction parts and the cartridge chamber. If the extractor is unserviceable, transfer the rifle to the repair shop

2.6. Disassembly and assembly of rifle

2.6.1. The disassembly of the sniper rifle may he partial and complete: partial disassembly is performed for cleaning, oiling and inspection of the rifle. Complete disassembly is required for cleaning the rifle if it is heavily soiled and after it has been exposed to the rain or snow, or when the rifle is to be newly lubricated and repaired.

The frequent disassembly of the sniper rifle is harmful to the weapon, as it tends to increase the wear of its parts and mechanisms. When disassembling and assembling the sniper rifle do not apply an extra effort and sharp blows.

When assembling the sniper rifle, check the numbers on its parts; the number stamped on the receiver should correspond to the numbers available on all its parts.

2.6.2. For partial disassembly of the sniper rifle, adhere to the following procedure:

a. Detach the magazine. Take the magazine with the hand, press the latch, move the bottom part of the magazine forward and detach it.

Then make sure that there is no cartridge in the cartridge chamber, for which purpose lower the safety lock, retract the reloading handle of the bolt support, inspect the cartridge chamber and release the reloading handle.

b. Detach the optical sight. Raise the handle of the clamping screw and turn it towards the eye shield as far as it will go; shift the sight backward and detach it from the receiver.

c. Detach the cheek plate. Turn the fastener of the cheek plate lock downward, remove the loop from the hook of the clip and detach the cheek plate.

d. Detach the receiver cover together with the retracting mechanism. Turn the axle pin of the receiver cover backward so as to engage it with the axle pin retainer; raise the rear part of the receiver cover and detach the receiver cover together with the retracting mechanism.

e. Detach the bolt support and the bolt. Pull back the bolt support as far as it will go, raise it and detach it from the receiver.

f. Detach the bolt from the bolt support. Pull the bolt backward, turn it so that its guiding lug comes out of the shaped recess of the bolt support and move the bolt forward.

g. Detach the firing and trigger mechanism. Turn the safety lever upward till it occupies the vertical position, shift it to the right and detach from the receiver; holding the trigger guard move the firing and trigger mechanism downward to detach it from the receiver.

h. Detach the hand guards. Press the axle pin of the upper band to the gas tube so that the lug of the axle pin tongue comes out of the band recess and turn the latch clockwise as far as it will go: shift the upper band to the muzzle part; pressing the hand guard downward and shifting it sideways, detach it from the barrel.

i. Detach the gas piston and the pusher together with the spring. Pull the pusher backward, disengage its front end from the gas piston port and detach the piston from the gas tube; insert the front end of the pusher into the gas tube and compress the pusher spring till it protrudes beyond the passage of the sight bar; detach the pusher and the spring, then detach the spring from the pusher.

2.6.3. To assemble the sniper rifle after partial disassembly, adhere to the following procedure;

a. Connect the gas piston and the pusher with the spring. Fit the spring onto the rear end of the pusher; insert the front end of the pusher into the gas tube, compress the spring and insert the rear end of the pusher together with the spring into the passage of the sight bar; pull the pusher backward and remove its front end from the gas tube sideways; insert the gas piston into the gas tube, and the front end of the pusher into the piston socket.

b. Connect the hand guards. Insert the rear end of the right (left) hand guard into the lower band, press the hand guard downward and fasten it on lugs of the supporting ring; fit the upper band onto the end pieces of the hand guards and turn the axle pin of the upper band to the gas tube so as to let its lug enter the recess on the band.

c. Connect the firing and trigger mechanism. Engage the recesses of the firing and trigger mechanism body with the stop pin and press the firing and trigger mechanism to the receiver; insert the safety lever pin into the hole of the receiver, then turn the safety lever in the clockwise direction so as to let the lug of the safety lever enter the lower recess of the receiver.

d. Connect the bolt to the bolt support, insert the bolt into the passage of the bolt support, turn the bolt so that its driving lug enters the shaped recess of the bolt support and move the bolt forward as far as it will go.

e. Connect the bolt support and the bolt. Insert the guiding lugs of the bolt support into recesses of the receiver and move the bolt support forward.

f. Connect the receiver cover together with the retracting mechanism. Insert the return spring into the passage of the bolt support, insert the lugs on the front end of the cover into recesses on the lower band; press the rear end of the cover to make the cover fit tightly to the receiver, turn the axle pin of the receiver cover forward to set it on the cheek plate limiter.

g. Connect the butt cheek plate. Put the cheek plate on the butt with its fastener to the right, fit the loop onto the hook of the clip and turn fastener upward,

h. Connect the optical sight. Match the slots on the sight bracket with the lugs on the left wall of the receiver; shift the sight forward as far as it will go and turn the handle of the clamping screw towards the objective so as to let the handle lug enter the recess of the bracket.

i. Connect the magazine. Insert the front hook of magazine into the opening of the receiver and turn the magazine to yourself to let the latch engage the rear hook of the magazine.

2.6.4. To completely disassemble the sniper rifle, proceed as follows:

a. Perform the partial disassembly as instructed in item 2.6.2.

b. Disassemble the magazine. Depress the lug of the locking strip into the hole of the magazine cover and shift the cover somewhat forward; holding the locking strip remove the cover from the body; releasing the spring gradually, remove it together with the locking strip from the magazine body, then detach the follower.

c. Disassemble the retracting mechanism. Remove the front return spring from the guiding bushing; compress the rear return spring and holding the guiding rod move it downward and to yourself to withdraw the guiding rod from the shackle hole; detach the rear return spring and the guiding rod from the guiding bushing.

d. Disassemble the bolt. Use the drift to drive out the stud securing the firing pin; remove the firing pin from the bolt passage, then remove the extractor and the spring from the bolt in the same way.

e. Disassemble the firing and trigger mechanism (Fig. 14). Press the auto safety lever and disengage the auto safety sear from the hammer; holding the hammer, press the trigger and gradually release the hammer from the cocking cam; disengage the ends of the trigger spring from the hooks of the firing and trigger mechanism body. Use a screwdriver to match the lugs trigger mechanism pins with recesses located on the right-hand wall of the firing and trigger mechanism body. Drive out the trigger mechanism pins and detach these parts. Use a drift to drive out the hammer pin, detach the hammer together with the mainspring, and then remove the mainspring.

f. Detach the gas tube together with the gas regulator. Turn the gas regulator so as to match the recess on its front part with the gas tube latch, press the latch and use the container-wrench to unscrew the gas tube, then remove the gas regulator from it.

2.6.5. Reassembling the sniper rifle after complete disassembly.

For this purpose proceed as follows:

a. Connect the gas tube and the gas regulator. Fit the gas regulator onto the gas tube, press the latch of the gas tube and screw in the gas tube with the aid of the container-wrench to match the recess on the gas tube front part with the latch, depress the latch lug into the recess of the gas tube, set the gas regulator at the required division.

b. Assemble the firing and trigger mechanism. For which purpose insert the trigger together with its spring into the body, insert the pin, match its lug with the recess on the right-hand wall of the body and turn the pin by means of the screwdriver. Fit the mainspring onto the hammer journals and insert the hammer into the body. Insert the sear into the body so that its tail enters the loop of the mainspring long end; insert the pin, match its lug with the recess on the right-hand wall of the body and turn the pin by means of a screwdriver.

Insert the auto safety into body so that its tail enters the loop of the mainspring short end; insert the pin matching its lug with the recess on the right-hand wall of the body and turn the pin by the screwdriver; insert the hammer pin and engage the ends of the trigger spring with the hooks of the body.

c. Assemble the bolt. Insert the extractor together with its spring into the seat of the boll. Pressing the extractor, insert the extractor pin; insert the firing pin into the passage of the bolt and insert the firing pin stud into the hole of the bolt from the side of the guiding lug and push the stud as far as it will go.

d. Assemble the retracting mechanism. Insert the guiding rod (with its flats facing forward) into the guiding bushing from the side of the large diameter hole, fit the return spring onto the guiding bushing from the side of the rod and compress the spring so that the end of the guiding rod with its flats comes out from under the spring; holding the guiding rod in such a position insert it together with the spring and the bushing into the lower hole of the shackle, then move the rod forward along the facets of flats into the upper hole; release the spring (its end should enter the shackle cup); fit the second return spring onto the guiding bushing.

e. Assemble the magazine. Insert the follower and the spring into the magazine body; compress the spring to fit the locking strip into the body and, holding it in that position, put the magazine cover on the body so that the lug of the locking strip enters the hole of the cover.

f. Further on proceed with assembly as instructed in item **2.6.3.**

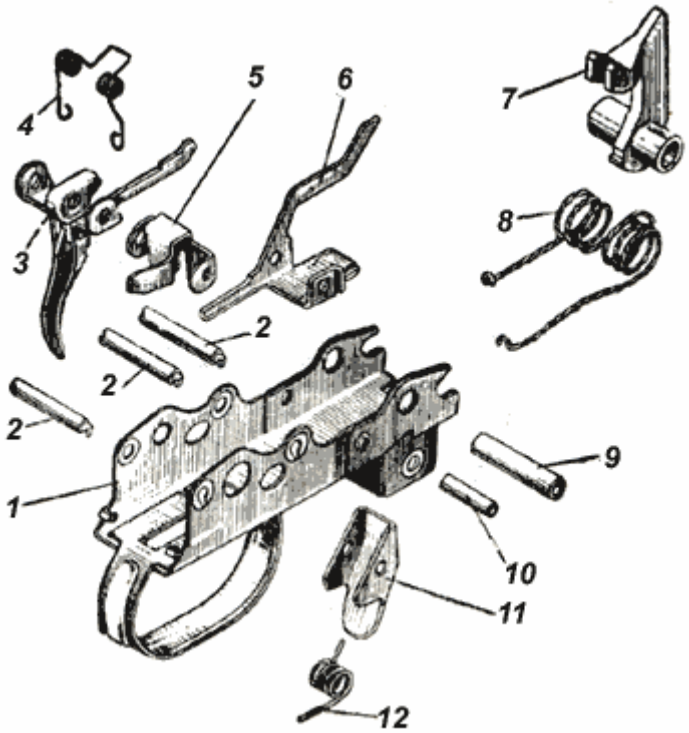


Fig. 14.Firing and trigger mechanism:
1 - firing and trigger mechanism body; 2 - trigger mechanism pin; 3 - trigger with rod; 4 - trigger spring; 5 - sear; 6 - auto safety; 7 - hammer; 8 - mainspring; 9 - hammer pin; 10 - magazine latch pin; 11 - magazine latch; 12 - magazine latch spring.

2.7. Cleaning and lubrication

2.7.1. The rifle should be cleaned in the following cases:

a. when preparing the rifle for firing;

b. after firing with live and blank ammunition, immediately after finishing the fire;

c. after guard duty or field exercises without firing, just on return to the barracks;

d. in combat situation and prolonged tactical exercises, daily during lulls of the fight and during the intervals in the exercises;

e. if the sniper rifle is not in use, at least once a week.

2.7.2. Lubricate the sniper rifle after cleaning. Apply lubricant only to the well-cleaned and dry surfaces of the metal immediately after cleaning to avoid the adverse effect of moisture on the metal.

2.7.3. For cleaning and lubricating the rifle following materials are used:

- liquid rifle oil for cleaning the rifle and lubricating its parts and mechanism, when the ambient temperature is within +50 grad. C to -50 grad. C;
- rifle oil for lubricating the barrel bore, the rifle parts and mechanisms after their cleaning, the said oil is used when the ambient temperature exceeds +5 grad C;
- RCHS solution for scouring out the barrel bore and other parts affected by the powder gases.

***Note** - The RCHS solution is prepared in a subunit. The composition of the solution is as follows:*

- *drinking water - 1 L;*
- *ammonium carbonate - 200 g;*
- *potassium bichromate - 3-5 g.*

The RCHS solution is prepared in the amount required for scouring the weapon in the course of 24 hours. Small amount of the RCHS solution may be stored in tightly plugged glass vessels, away from heaters (in a dark place) for not more than 7 days. It is prohibited to fill the oilers with the Ð×Ñ solution.

- waste or special paper KB-22 for wiping, scouring and lubricating the sniper rifle;
- tow free from boon only for scouring the barrel bore out.

2.7.4. To clean the sniper rifle, proceed as follows:

a. Prepare materials for cleaning and lubrication;

b. Disassemble the sniper rifle;

c. Prepare accessories for use during cleaning;

d. Scour out the barrel bore.

To scour out the barrel bore with liquid rifle oil put the tow on the scourer end and place the tow fibers along the scourer rod; soak the tow in liquid rifle oil. Insert the cleaning rod with the scourer and the tow into the barrel bore and secure the container cover on the flash eliminator. Holding the rifle with one hand smoothly move the

scourer with the tow forward along the entire length of the barrel bore several times. Remove the cleaning rod, change the tow, soak it in liquid rifle oil and, adhering to the above procedure, scour the bore several times. Then thoroughly wipe the barrel bore with the clean dry tow, then with a clean waste cloth. To clean the barrel bore with the Ð×Ñ solution, use the brush soaked in the solution; then wipe the barrel bore with tow. Proceed with cleaning the bore with the RCHS solution to completely remove the fouling. Having cleaned the rifled portion of the bore, clean the cartridge chamber.

e. Clean the gas chamber and the gas tube with the help of the cleaning rod or a wooden stick, wrapped with waste cloth around, washed with liquid rifle oil or the Ð×Ñ solution; wipe the gas chamber and the gas tube dry after they have been cleaned; wipe the barrel bore with waste cloth once more and inspect it to see that no tow, waste cloth, rags or foreign matter are left therein;

f. Clean the receiver, the bolt and the gas piston with waste cloth soaked in liquid rifle oil or the Ð×Ñ solution, then wipe them dry;

g. Wipe dry the rest metal parts with waste cloth;

h. Wipe the wooden parts with dry waste cloth.

2.7.5. Lubricate the sniper rifle as follows:

a. Lubricate the barrel bore with the help of the scourer and the waste cloth, soaked in lubricant; lubricate the cartridge chamber;

b. Lubricate all the remaining metal parts and mechanisms with oiled waste cloth;

c. Apply a thin layer of lubricant, as excessive lubrication tends to increase soiling of the rifle parts and may result in stoppages during firing;

d. Do not lubricate wooden parts.

2.7.6. Assemble the rifle and check the functioning of its parts and mechanisms.

2.7.7. Wipe the external surfaces of the optical sight with clean waste cloth. Remove the cap of the reticle illuminating set and wipe the cell, the body and the cap. Should the surfaces of the objective and eyepiece lenses be soiled, wipe them with cloth. Never wipe the lenses and glasses with a waste cloth, already used for wiping other parts of the sight. Do not lubricate them or touch with fingers. It is prohibited to strip the sight.

2.8. Storage and transportation of rifle

2.8.1. The rifle should be always kept unloaded, the optical sight and the magazine should be detached, the knife bayonet removed, the hammer released from the cocking cam, the rifle set at safe, the sight slide set at the division "n".

2.8.2. In barracks and in camp keep the rifle in arm racks, keep the optical sight covered, keep magazines, a carrier for the sight and magazines, the knife bayonet in scabbard, a bag for the SPTA, the sling for carrying the small arms and accessories in a special section of the same arm rack. The carrier for the optical sight and the magazines, the slip cover and the sling should be clean and dry.

2.8.3. In case of a temporary stay in some building keep the rifle in a dry place, away from a door, stoves and heaters. In combat situation hold the rifle with the hands.

2.8.4. In field exercises and on march, carry the rifle in the "slung" position. The sling should be so adjusted as to prevent the rifle from striking against the hard objects of the accoutrements. The rifle is

carried with one magazine attached. The rest magazines are in the carrier.

2.8.5. When traveling by trucks or armored personnel carriers hold the rifle between the knees, in the vertical position, and when traveling by tanks hold the rifle with the hands, taking care to protect from striking against the armor.

2.8.6. When transported by railway or by water, place the rifle on a special arm rack. If the carriage or the ship is not furnished with arm racks, hold the rifle with the hands or put it on the shelf, in doing so make sure that it will not drop or be damaged.

2.8.7. To prevent the barrel from building or rupture, never plug the bore with anything.

2.8.8. Prevent the optical sight from dropping, protect it from sharp blows and jolts, and prevent moisture and dust from getting inside the optics. Keep the optical sight protected with the cover in dry heated premises; if the sight is attached to the rifle, but fire is not delivered, protect the sight with its slip cover. Wipe thoroughly wet sights with dry waste cloth, and dry the slip covers. It is prohibited to keep the sights near stoves and bonfire.

Authors Notes:

I have adapted this manual from resources obtained at **http://kalashnikov.guns.ru/manual/english/svd/1.html**

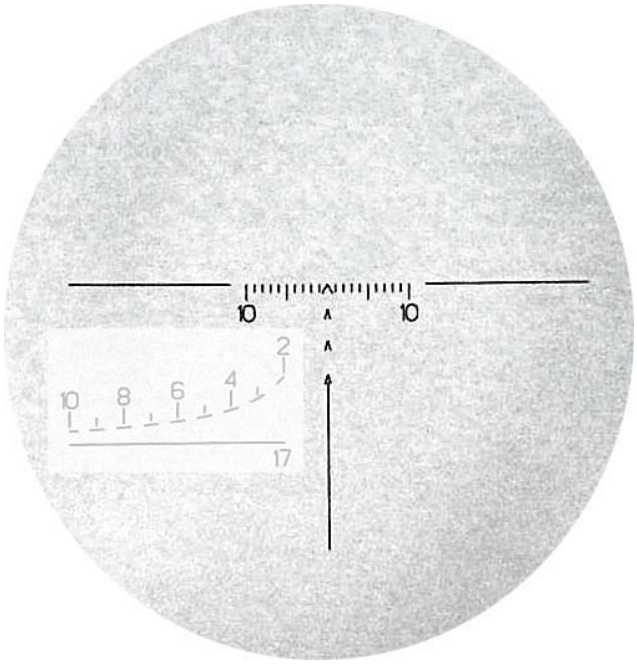
I have attempted to correct most grammatical errors that were in the original document. I assume this to be non-copyright material. I offer this freely to anyone who wishes to use this for personal purposes.

Any comments or suggestion to improve this document. Please forward to: **hootbro@idworld.net**

Instructions for zeroing the PSO-1 and POSP type of scopes with military reticle.

To bore sight your scope:

• Set your rifle on a steady rest 100 meters (about 109 yards) from your target.
• Remove the receiver cover, bolt carrier, and cheek pad if you have one. Leave the scope on.
• Look through the barrel bore and line it up with the target so you can see the bullseye at the end of the barrel.
• Now make sure your rifle does not move and carefully look through your scope.
• If the reticle is not pointing at the bullseye, turn the adjustment drums to align the reticle with the target.
• Reassemble the rifle.



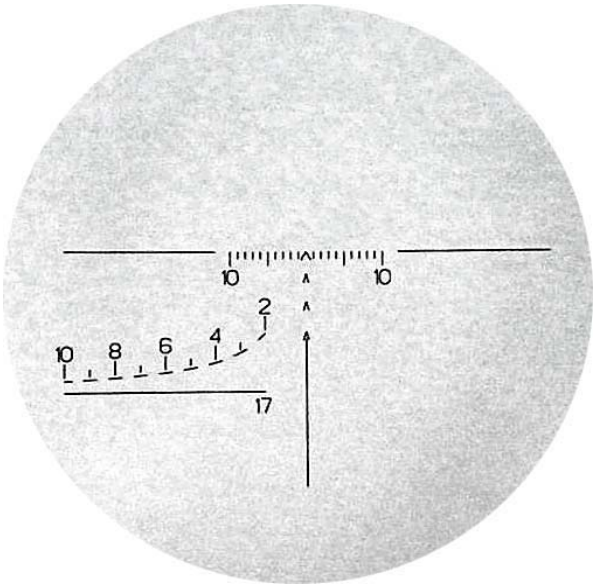
Sighting in the scope:
• Looking through the scope, align the top chevron (inverted V) with the center of your target.
• Fire a few shots to determine if your point of aim equals your point of impact (POA = POI).
• Holding the rifle steady aiming at your target, turn the scope turrets to move the reticle over to your POI holes on the target. You may need to repeat this process several times.
• To avoid “chasing your zero” take at least three shots between each adjustment of your scope's reticle.
• Once you have determined your POI = POA you can now adjust the numbered part of the two adjustment drums on your scope.

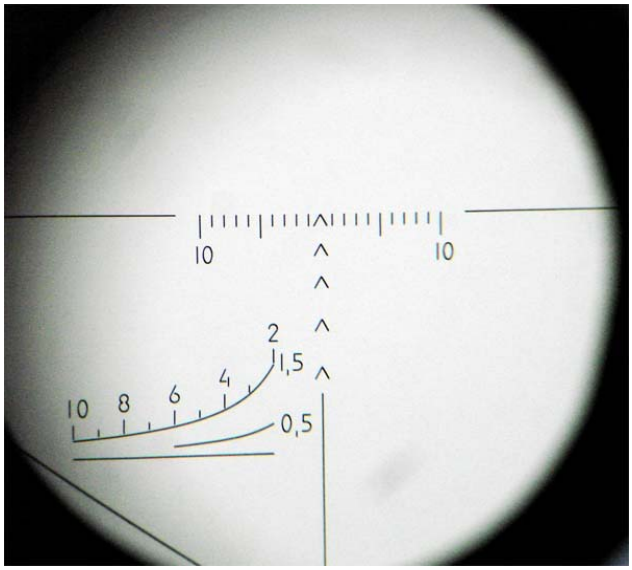
If the numbers on the turrets do not reflect "1" as your elevation (top drum) and "0" as your windage:

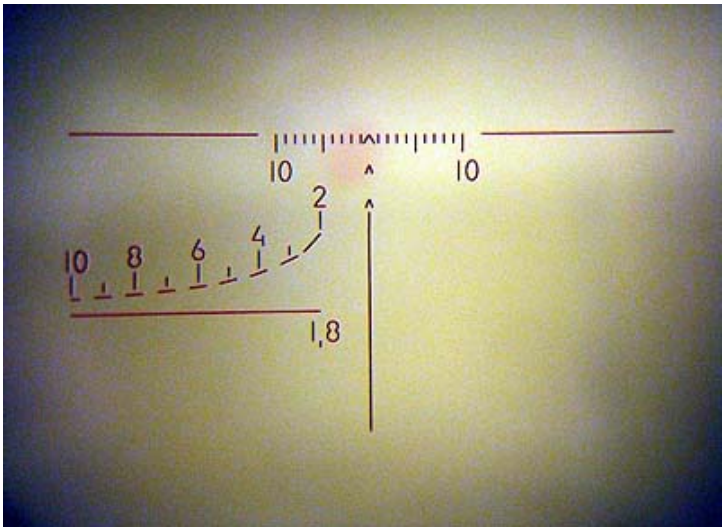
• **LOOSEN** (do not remove!) the two silver screws (ignore the tiny center screw) on the top of each turret enough to rotate the numbered part of the drum.
• Spin the center numbered part of the drums to reflect zero (0) for windage and one (1) for elevation lined up with the black line on each index plate.
• Re-tighten the screws (hold the top of each drum secure as you do this or it will rotate as you tighten each screw).
• Take a few more shots to verify all is correct. POA should now = POI. *

Using the built-in range finder.

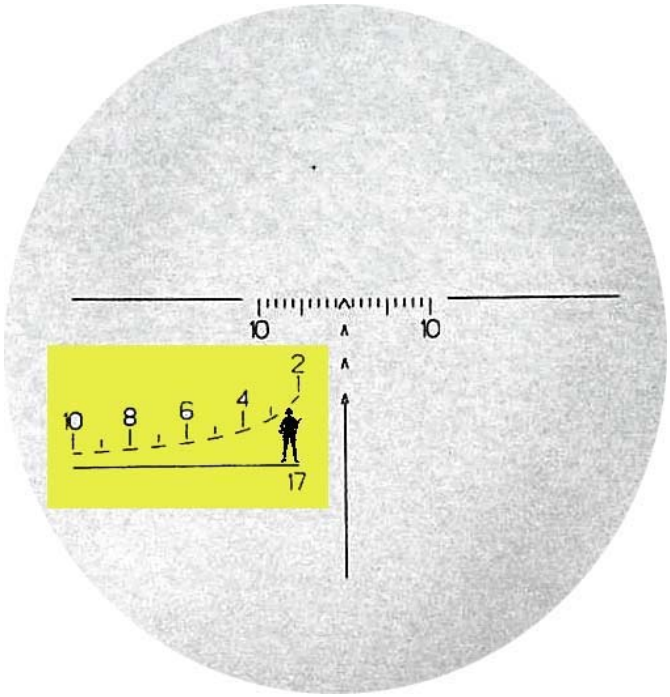
The reticle of the military PSO and POSP scopes have a range finder that can be used to determine the distance to a particular target. Some reticles are calibrated for targets from 1.5, 1.7, or 1.8 meters tall, depending on type.** To determine your type of range finder look at the number near the bottom line of the reticle.







Using the range finder.



Place the target on the bottom horizontal line of the range finder. Where ever the top of the target touches on the sloping scale is the distance in meters you are from that target. The range finder scale is limited to targets from 200 to 1000 meters away. The above illustration represents a 5' 6” target about 250 meters away.

Once you know the distance to the target, adjust the elevation drum to the corresponding number (2 = 200, 3=300, etc.) in meters. From 0 to 3 each click on the elevation drum equals 100 meters, from 3 to 10 the clicks equal 50 meter increments.

Your elevation drum adjusts to 1000 meters. For targets beyond that, use the chevrons below the top aiming point in the reticle. Each chevron represents an additional 100 meters in hold over.

Windage correction:
Because the scope is off-set to the rifle's bore, you may need to make a windage correction for distances beyond your 100 meter zero. You have two options to accomplish this task. Either turn the windage drum up or down or use the hash marks to the left and right of the center chevron in the reticle. You simply “hold over” left or right, aligning your target over a particular hash mark. Each hash mark represents one click on the windage turret which translates to 1.9 inches of movement at 100 meters.

*Remember your reticle and elevation drum is calibrated for a projectile around 150 grains and a distance in meters not yards.
** 1.5 meters = 4.9 feet, 1.7 meters = 5.58 feet, 1.8 meters = 5.9 feet

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Instruction Manual
for
POSP 4x24 / PSO-1
Rifle scopes

1. NTRODUCTION

Before using the scope carefully read this instruction manual.
The scope is equipped with built-in mount that can incorporate three different types of clamps designed to mount on distinct types of rails. Before attempting to mount the scope learn which type of mount your plate will accept as it is crucial for proper function of the scope.
The scope is designed with extended eye relief and has a rangefinding capability. Red illuminated reticule will ensure target acquisition at low light conditions.
As the design constantly being updated the actual scope may slightly differ from this manual.
The scope can be used in a variety of climatic conditions with temperatures ranging from -50°C...+50°C (-50°F…+120°F)
The scope is also sealed against sand and dust as well as filled with Nitrogen to prevent fogging.

2. SPECIFICATIONS

Magnification…… 4x
Input lens dia……..24 mm
Field of view…….. 6°
Eyerelief…… 68 mm
Battery type…….. "AA"
Temperature range…… -50° F...120° F
Dimensions…….. 16" x 5.4" x 2.8"
Weight……20 oz.

3. INCLUDED EQUIPMENT

3.1 All scope packages must contain items listed under “STANDARD PACKAGE”
3.2 Manufacturer, upon its own discretion or by the customer request might also include items from the “OPTIONAL ACCESSORIES”

STANDARD ACCESSORIES

Scope w/illuminated reticule – 1
Rubber eyepiece – 1
Manual – 1
Carry case – 1

OPTIONAL ACCESSORIES

Light filters – 1
Mounting plate – 1
Rubber eyepiece – 1
Cold battery pack -- 1

4. GENERAL DESCRIPTION

4.1 Inserting / Replacig the Battery

The scope is quipped with reticule illumination system that uses single 1.5V “AA” battery. To replace battery remove cover from the battery compartment, by pressing it down and twisting it counter clockwise.
Install new battery keeping the polarity, close the battery compartment.
If reticule looses its brightness over time, replace the battery.

4.2 Mounting the scope

The scope has a built-in mount that can be equipped with three different types of clamps designed to mount on different types of rails. Before attempting to mount the scope learn which type of mount your plate will accept as it is crucial for proper function of the scope, as some mounting clamp are not designed to accept certain types of rails.

PLEASE NOTE, that by "not designed to accept certain types of rails" we mean the configuration of the rail and **NOT** its size, as 99.99% of the scopes, if properly adjusted (please see 4.2.1), will fit the bulk majority of the mounting rails found on AK family of guns. Thus, it might be possible to mount the scope on the gun, you may encounter such problems, as too much or not enough of eye relief, or the scope won't hold its "zero" if removed. Often you can tell that the scope isn't designed to fit the rail on your gun by mounting the scope and firing a few shots. If the clamp on your scope doesn't match the rail, the scope will fall off after the third or fourth shot, no matter how tight it is locked.

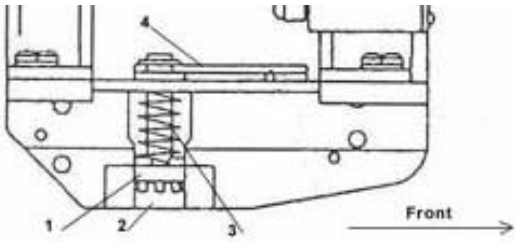
To avoid this, you should learn about the three types of Russian rifle scope clamps and which rails should be used with each type of clamp.

- **A.** Russian Standard Small Arms Mounting System clamp, used on all of the Night Vision Rifle Scopes and some daylight scopes. This type of mount is universal and will properly fit all types of mounting plates.
- **B.** PSO-1 or Dragunov style mount found on the PSO/POSP rifle scopes. This type of mounting clamp has a forward placed stopping pin. The clamp moves all the way forward on the rail until the stopping pin comes to rest at the closed end of the rail. REMEMBER that the scopes with the PSO- type of mounting clamp will properly fit the plate on your rifle ONLY if the front end of the rail is CLOSED. This won't allow the scope to come off at the other end of the rail and the scope will always retain its "zero".
- **C.** Saiga/AK type of mounting clamp has the rear placed stopping pin and designed to fit mounting plates found on AK, Saiga, and Vepr rifles. The clamp has to slide forward on the rail until it stops as the pin comes against the back (right) end of the mounting plate. REMEMBER that the scopes with the AK/Saiga type of mounting clamp will properly fit the plate on your rifle ONLY if the plate has a CLOSED right end of the rail.

To mount the scope release the locking lever and align the rail on your gun with mounting clamp, slide the scope forward on the rail until it stops. Close the locking clamp. If the scope can not slide along the rail or the locking lever can not be closed with reasonable force the mounting clamp has to be adjusted. Adjustment might be needed if the scope sits too loosely.

4.2.1 Locking clamp adjustment

LOCKING CLAMP ADJUSTMENT REQUIRES NO SPECIAL TOOLS OR SKILLS, PLEASE READ THE INTSRUCTIONS BELLOW



Locate the locking clamp assembly, (see picture on the left). The locking assembly consists out of the locking rail (1) round adjustment nut (2), spring (3) and the locking lever (4). The round nut controls the tightness of the locking mechanism. To adjust the clamp, turn the scope up side down, presses down and hold the locking rail (1) with the thumb of your left hand. With your right hand adjust the nut (2) by turning it. Turn the nut clockwise to tighten the mount and counterclockwise to loosen it up.

5. Sighting and Zeroing the Scope

Tightly secure the gun at the firing station using sandbags or special sighting rack to avoid shooter related inaccuracy.

Using your iron sights fire 4-5 shot group. Without moving the rifle look through the scope and determine average point of impact (API). One or two shot may deviate, this it is normal, disregard those shots. Make necessary adjustments to the scope using the windage and the elevation turrets. If during sighting process you run out of adjustment room on either the windage or the elevation turret do the following: Loosen two screws located on the top of the turret and turn the black, top part of the turret without touching the silver cam. Once the reticule is in the required position stop turning the top part of the turret and now move the silver cam somewhere to the middle of the scale relative to the dash mark on the scope. After adjusting the reticule, fire a few more control shots and compare the API with the previous group of shots if the result are the same the scope is sighted. Now you will have to put the elevation cam to “zero” position which in some cases may not be the actual “0” on the elevation cam. Please refer to the table bellow to see where the actual “zero” is on your scope.

To adjust the elevation cam to “zero” position loosen the two screws on the top of the turret and carefully move the cam to proper position. Tighten the screws.

5.1 Elevation turret

There are at least two different elevation turrets that come with POSP/PO/PSO type scopes. One has an uneven scale numbered from 0 to 10 with different number of clicks between the numbers. The other turret has a scale from 0 to 20 with evenly incremented clicks. Bellow are two tables that will give you a rough idea on how to use the both types of turrets to make adjustments for the bullet drop at distances between 100 and 850 meters. After 850 meters you'll have to use the consequently following chevrons for each 100 m of the distance for up to 1200 meters. Remember that the data in these tables is estimated as the actual bullet drop depends on many other factors, such as the ammo, rifle, surrounding environment, air temperature, and etc. Also, the bullet drop compensation presented in these tables is for 7.62x54R and with some minor adjustments the .308 round can also be use. If you have a scope with 400m rangefinding reticule it is calibrated for 7.62x39 round. In this case you should use the chevrons to compensate for each 100 m of the distance for up to 300 m.

Table 1, for Elevation Turret with 0-10 scale, 7.62x54R round

Turret Position	0	1	2	3	3.5	4	4.5	5	5.5	6	6.6	7	7.5	8
Distance, m	100	200	300	350	400	450	500	550	600	650	700	750	800	850

Table 2,for Elevation Turret with 0-20 scale, 7.62x54R round

Note: When zeroing the scope assume 1.5 (one click past "1") as a "zero" position.

Turret Position	1.5	2	3	3.5	4	4.5	5	5.5	6.5	7.5	8	9	10	11
Distance, m	100	200	300	350	400	450	500	550	600	650	700	750	800	850

5.2 Using the scope

5.2.1 While aiming you must put your eye on the optical axis of the scope so the image appears flat and without shadows on the edges. Using soft rubber eyepiece will help you to properly align your eye on the optical axis and ensure the proper eye relief.

5.2.2 Use the extendable shade for shooting at bright daylight conditions to prevent sunshine directly striking the objective lens and preventing excessive glare.

5.3 Aiming and shooting at fixed targets.

5.3.1 Adjust the elevation turret or chose the appropriate chevron with respect to the range to the target. Assuming there is no cross wind, keep the windage turret at the “0” position.

5.4 Aiming and shooting at moving targets

5.4.1 While shooting at moving targets it is necessary to aim ahead of the target.

5.4.2 To determine how far the aiming point has to be taken out you’ll need to estimate the speed of the target and the distance to it. The faster the target moves and the further the distance to it the further ahead you’ll have to aim.

5.4.3 Have the moving target aligned with horizontal hairs of the reticule as you aiming.

6. SAFEKEEPING

6.1 Avoid hard strikes to the scope or dropping it.

6.2 After using the scope in wet conditions wipe it with dry soft cloth and live it to dry out at temperature not exceeding 112 F°

6.3 To protect the glass surfaces of the scope always use objective lens and eyepiece cups when the scope is not in use.

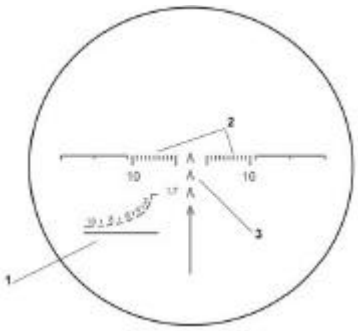
6.4 NEVER ATTEMPT TO FIX THE SCOPE YOURSELF OR TAKE IT APART FOR WHATEVER REASON. VIOLATION WILL VOID ALL THE WARRANTIES.

6.5 When not in use keep the scope in a dry place at room temperature with humidity not exceeding 80%

7. WARRANTY

7.1 The scope meets or exceeds the quality standards set forth by the manufacturer and its technical specifications match those listed in this manual.
7.2 The scope carries 24 months limited warranty against manufacturing defects from the date of sale.
7.3 The retailer can not store the scopes for more then 3 years from the date of the manufacture.
7.4 The scopes can still be sold after the expiration of the 3-year storing limit after receiving an approval from the manufacturer.
7.5 If the scope fails during the warranty period the customer is entitled to have the scope repaired of fixed at the desecration of the dealer of the manufacturer. Each party is responsible for shipping cost of the scope at their end.
7.6 The scope must be shipped to the manufacturer of to the party providing the warranty support well packaged to avoid additional undue damage. The package must contain the detailed description of the problem and the clearly written return address.
7.7 If the date of sale can not be determined the warranty period assumed to begin at the date of manufacture of the scope.
7.8 If maintenance or feasible and justifiable repairs have to be done upon expiration of the warranty period, all costs related to these services is responsibility of the customer.

8. RETICULE FOR 7.62X54R



8.1 Rangefinder

8.1 The rangefinder works by placing the target (1.7 m or 5'8" in height) between the horizontal and the top reclining line with numbers. On the reclining line locate the number closest to the point where the target touches the line. Multiply that number by 100, this is the distance to the target in meters. 1meter = 1.11 yards.

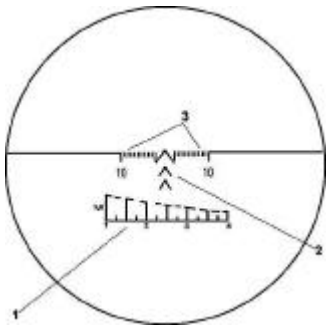
8.2 Windage scale / rangefinder

Windage scale can be used to make horizontal adjustments or as a rangefinder. Shifting the aiming point by one division left or right will move the point of impact by 10cm / 4" for every 100m / 333 ft of the distance. The distance to the target can be determined by assuming that a 1m / 3'4" wide/long object fits between the small divisions at 100 m / 333 ft.

8.3 Aiming chevrons

The chevrons designed to adjust for bullet drop at 1000, 1100 and 1200 meters, aiming with 2nd, 3rd and the 4th chevrons accordingly.

9. RETICULE FOR 7.62X39



9.1 Rangefinder

The rangefinder works by placing the target (1 m or 3'4" in height) between the horizontal and the top reclining line with numbers. On the reclining line locate the number closest to the point where the target touches the line. Multiply that number by 100, this is the distance to the target in meters. 1meter = 1.11 yards.

9.2 Aiming Chevrons

The chevrons designed for aiming at 100, 200 and 300 meters for the 1st 2nd and the 3rd chevron accordingly.

9.3 Windage scale / Rangefinder

Windage scale can be used to make horizontal adjustments or as a rangefinder. Shifting the aiming point by one division left or right will move the point of impact by 10cm / 4" for every 100m / 333 ft of the distance. The distance to the target can be determined by assuming that a 1m / 3'4" wide/long object fits between the small divisions at 100 m / 333 ft.

Kalinka Optics Warehouse User Manual

POSP Fixed Magnification Rifle Scope Manual

INTRODUCTION

Before using the scope carefully read this instruction manual. The scope is equipped with built-in mount that can incorporate three different types of clamps designed to mount on distinct types of rails. Before attempting to mount the scope learn which type of mount your plate will accept as it is crucial for proper function of the scope. The scope is designed with extended eye relief and has a range finding capability. The red illuminated reticle will ensure target acquisition in low light conditions. The 'D' model denotes a diopter adjustment which allows you to independently focus the scope to adjust for your specific eyesight characteristics. As the design is constantly being updated the actual scope may slightly differ from this manual. The scope can be used in a variety of climatic conditions with temperatures ranging from -50°C to +50°C (-50°F to +120°F). The scope is also sealed against sand and dust as well as filled with Nitrogen to prevent fogging. The POSP fixed magnification series includes 4x24, 6x24, 6x42, 8x42 versions.

There are three basic mounting versions. The AK or 'V' version will fit any AK-style side rail including AK, VEPR, SAIGA, AK's manufactured by K-Var, KBI, Hesse, Century, Arsenal USA, etc., WASR, SLR-93, SLR-95, SLR-101, MK-11, SAR, WUM, SA85M, Maddi, Norinco, Poly-Tech and others. On some AK and AK variants, such as the WASR, a side rail may not be preinstalled on the rifle. The AK version additionally comes in two types, one which screws up from the bottom and connects to the side rail by bending the bottom of the mount up to create a tight fit. The other type is an eccentric bar with a half moon that is turned 180 degrees to put pressure on the side of the rail. Both are equally effective. The SVD/SKS version will fit any SVD style rail including SVD, NDM-96, Tigr, and Romak-3/SSG-97/PSL rifles. On the SKS, it is necessary to install a side rail. Kalinka Optics carries both side rails and mounting instructions for the SKS. The Weaver version will fit any standard Weaver-style or Picatinny rail.

Turret click on a regular POSP is 5 cm at 100 meters while on PRO models it is 1.25 cm at 100 meters. POSP scopes come in either a dark or light grey hammer finish or an advanced black baked enamel finish. Some older POSP's use a 1.5v AA battery while most POSP's use a brighter 3v bulb and power source. The D-357 button batteries are common watch batteries available at www.kalinkaoptics.com, or any local store. On older POSP's that have an extended battery compartment, an AA battery adapter can be purchased to convert a 3v model to use a 1.5v AA battery. On the newest POSP's, the battery compartment is sunk into the back column of the side mount and the AA battery adapter will not fit.

SPECIFICATIONS

Magnification	4x, 6x, 8x
Objective Aperture	24 or 42 mm
Illuminated Reticule	Built-in (red)
Reticle Style	1000m Dragunov or 400m Simonov
Supply Voltage	2 x D-357 button batteries
Waterproof	Yes
Nitrogen Filled	Yes
Operating Temperature	-50 to +50oC

Standard Accessories

Scope w/ illuminated reticule – 1 Rubber eyepiece – 1 Manual – 1 Carry case – 1. All scopes come with flip-up objective cap

Optional Accessories

Colored bulbs
Light filters
Mounting plates
Rubber eyepieces
Winter battery pack adapters
Protective mounted scope covers

ALL AVAILABLE AT www.kalinkaoptics.com

GENERAL DESCRIPTION

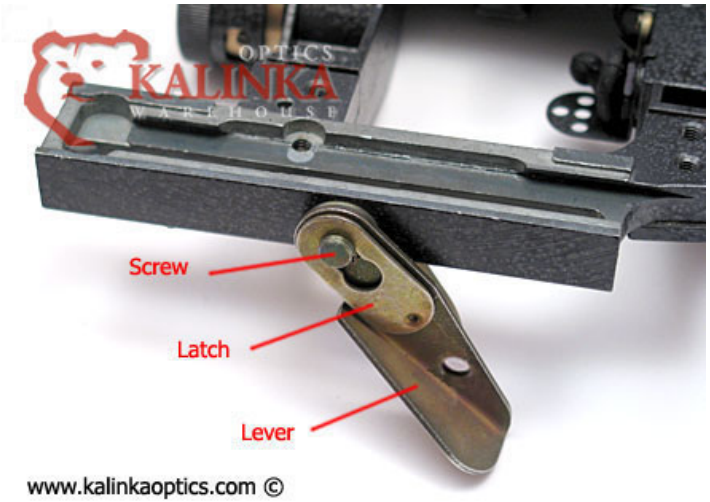
The Battery

The scope is equipped with a reticule illumination system that uses two D-357 silver-oxide batteries. Radio Shack carries these and they are Radio Shack # 23-105. Our web site also lists possible battery types, www.kalinkaoptics.com. To replace battery remove cover from the battery compartment, by pressing it down and twisting it counter clockwise. Install new battery keeping the polarity, close the battery compartment. The battery goes in counter-intuitively. The side with the writing, the + side, goes in first. If reticule looses its brightness over time, replace the battery.

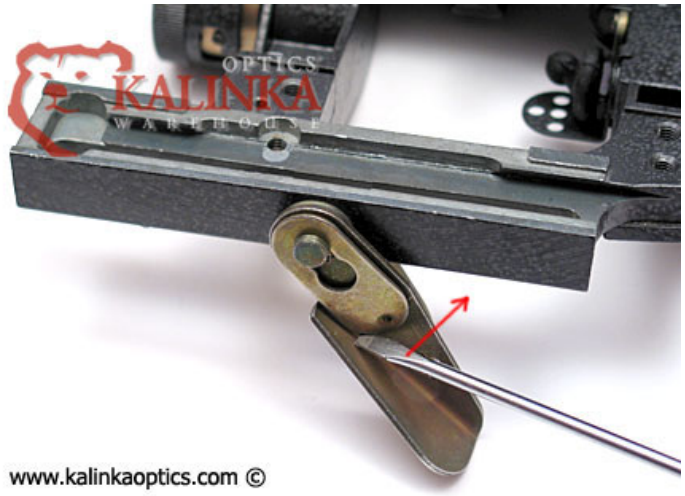
Mounting the Scope

If you are not careful to ensure you have the correct model for you specific side rail it is possible to mount the scope on the wrong rail. While it may seem to 'fit', you will encounter problems such as too much or not enough of eye relief, or the scope won't hold its "zero" if removed. Often you can tell that the scope isn't designed to fit the rail on your gun by mounting the scope and firing a few shots. If the clamp on your scope doesn't match the rail, the scope will fall off after the third or fourth shot, no matter how tight it is locked. To avoid this, you should learn about the three types of Russian rifle scope clamps and which rails should be used with each type of clamp.

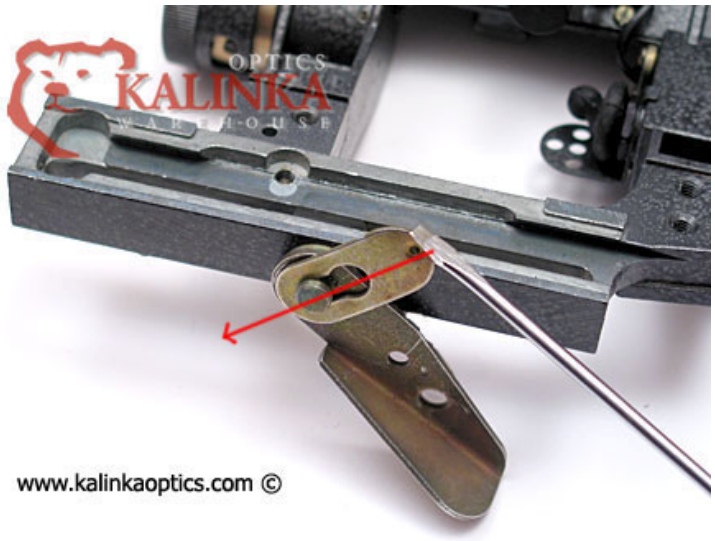
Clamp Adjustment



Step 1: As with all directions read through the directions in their entirety before even thinking of touching anything. Then re-read them. Sit down and place the top of the scope between your legs so that the scope is inverted. Locate the retaining clip that is holding the lever onto the scope. Place a small flat screwdriver blade on the edge of the retaining clip, and using your thumb rotate the retainer out of its indentation.



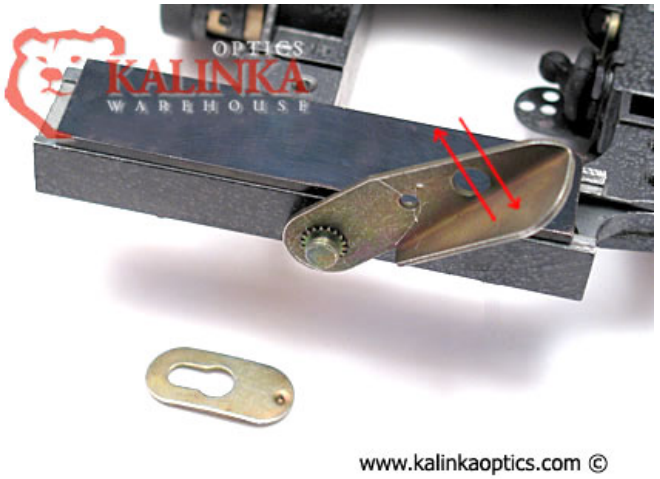
Step 2: Once the retaining clip is rotated 90 degrees, you can easily slide it off of the center shaft of the clamp lever. It will now pull off of the scope.



Step 3: Once the clip is removed, you can disengage the lever from its gear on the center shaft. Be sure not to lose the clip or the washer underneath the lever.

Step 4: Slide the scope onto your side rail and then reposition the lever so that you have a nice tight fit. Be careful not to over-tighten!

Step 5: Once the proper tension is obtained, replace the lever onto the gear, making sure to relocate the stem of the bushing arm in the hole in the lever flag. Also make sure you have not lost the special washer that fits under the lever.



Step 6: After reassembling, replace the lever retaining clip by inserting the center shaft into the large hole in the clip.

Step 7: Simply slide the clip back into the indentation. Try the fit, make sure the scope will slide onto the plate easily, and will also tighten up. There should be a moderate amount of tension on the lever when it is about 85 percent closed, and it should take mild pressure to lock it completely. Do not over-tighten. Repeat the procedure to adjust the tension if needed.

WINDAGE AND ELEVATION

Elevation Turret

Since the range calibrations for both the AK and SVD versions on both the 1000 meter Dragunov and 400 meter Simonov models are measured in equal amounts of MOA, all versions of the POSP can be used effectively with any caliber of weapon including 7.62x39mm, .308, .223 NATO, 5.45x39mm and 7,62x54R. The 1000m Dragunov rangefinding reticle includes extended distance inverted chevrons providing aiming points for 1000, 1100, and 1200 meters making it perfect for use on the .308 versions which require longer range reticules to make full use of their capabilities. After 850 meters you'll have to use the consequently following chevrons for each 100 m of the distance for up to 1200 meters. Remember that actual bullet drop depends on many factors, such as the ammo, rifle, surrounding environment, air temperature, etc.

The POSP 4x24 additionally is available with a 400 meter rangefinder. It is the only version available with the 400 meter reticle. The 400 meter reticle has an extremely effective and useful height-based rangefinder for dual use, with graduated scales for both standing and prone figure estimation. The military style reticle has a 400 meter height based gradient (choke style) rangefinder with holdover aiming marks for quick reaction shooting at 100, 200, and 300 meters, when used with 7.62x39mm. Once the primary inverted chevron aiming mark is adjusted for zero at 100 meters, the next two lower chevrons are bullet drop compensated for shots at 200 and 300 meters automatically.

The dial on the top of the scope is for adjusting for range. Again each number indicates 100 meters of range. Hence if you are firing at a target 200 meters distant you would set the dial on "2". The dial adjusts in 50 meter increments. Setting it on "0" would be for close in firing of less than 50 meters.

POPS/PSO Dial Settings										
Scale fractions	1	2	3	4	5	6	7	8	9	10
Angles of aim (MOA) (in min)	3.6	7.1	11	14	18	22	25	29	32	36
Line of sight movement at 100 meters in cm	10	21	31	42	52	63	73	82	94	104
Scale fractions	11	12	13	14	15	16	17	18	19	20
Angles of aim (MOA) (in min)	39	43	47	50	54	57	61	65	68	72
Line of sight movement at 100 meters in cm	115	125	136	146	156	167	177	188	198	201

Elevation/range adjustment
Each number is equal to 100 meters
Windage/horizontal adjustment
The red and white marks on the back of the dial are reference marks and can be ignored

Windage

The dial on the side of the scope is for adjusting for wind effects. The numbers in black move the reticle to the left which you would do if the wind was blowing from right to left across your line of fire. The numbers in red are just the opposite and move the reticle to the right. The movement direction of line of site is shown on the nut of the turret.

Each movement of the dial one full notch is equal to 0.1 meters line of site movement at 100 meters and 0.3 meters at 300 meters. The lock, which is located on the turret, allows the turret to be set in between two notches.

RETICULE FOR 7.62X54R IN DEPTH

Rangefinder

The rangefinder works by placing the target (1.7 m or 5’8” in height) between the

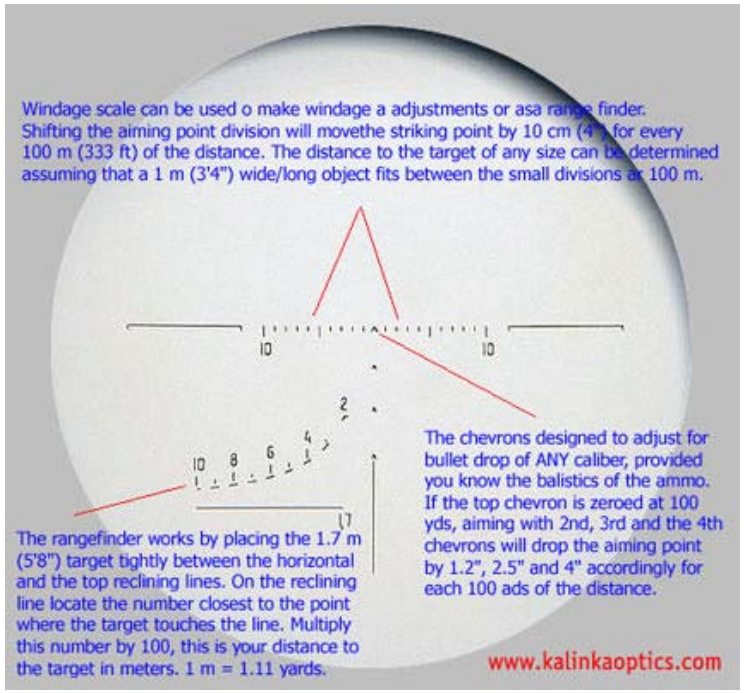
horizontal and the top reclining line with numbers. On the reclining line locate the number closest to the point where the target touches the line. Multiply that number by 100; this is the distance to the target in meters. 1meter = 1.11 yards

Windage Scale

Windage scale can be used to make horizontal adjustments or as a rangefinder. Shifting the aiming point by one division left or right will move the point of impact by 10cm / 4” for every 100m / 333 ft of the distance. The distance to the target can be determined by assuming that a 1m / 3’4” wide/long object fits between the small divisions at 100 m / 333 ft.

Aiming chevrons

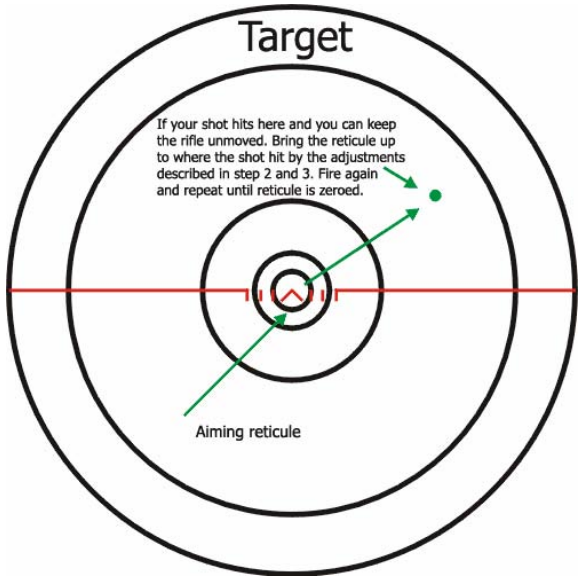
The chevrons designed to adjust for bullet drop at 1000, 1100 and 1200 meters, aiming with 2nd, 3rd and the 4th chevrons accordingly.


Windage scale can be used o make windage a adjustments or asa range finder. Shifting the aiming point division will movethe striking point by 10 cm (4") for every 100 m (333 ft) of the distance. The distance to the target of any size can be determined assuming that a 1 m (3'4") wide/long object fits between the small divisions at 100 m.
The chevrons designed to adjust for bullet drop of ANY caliber, provided you know the balistics of the ammo. If the top chevron is zeroed at 100 yds, aiming with 2nd, 3rd and the 4th chevrons will drop the aiming point by 1.2", 2.5" and 4" accordingly for each 100 ads of the distance.
The rangefinder works by placing the 1.7 m (5'8") target tightly between the horizontal and the top reclining lines. On the reclining line locate the number closest to the point where the target touches the line. Multiply this number by 100, this is your distance to the target in meters. 1 m = 1.11 yards.
www.kalinkaoptics.com

Sighting and Zeroing the Scope

Step 1: The first step is to ensure that the rifle is zeroed with the iron sights. Also this process is much easier with little wind effects so do this on a day that isn't windy if possible. Set up the rifle on a firm and solid base and aim at a target with the iron sights at a distance of 50 meters. At this point attach the scope and set the range on the tick between the "0" and the "1" which is the 50 meter mark. Set the windage to "0". Now see if the aiming reticle is lined up with the target. If it is then your sight is considered an adjusted one. If it is not in line then rotate the dials (range and/or windage as necessary) to bring the reticle onto the target. At this point if you have had to a move the dials away from the 50 meter mark and "0" then you will have to move the dial back to 50 meter mark and "0" without changing the position of the aiming reticle. Go to step 3 if this is your situation. For those of you who cannot bring the reticle into position because the range of motion of the range dial will now allow it another step is required (this was the case with me - since the dial cannot move to the left of the "0" far enough for my situation). For those unable to move the reticle into the proper position return the dials to their default at the 50 meter mark for range and "0" for windage and go to step

Step 2: If you were unable to bring the reticle into proper position you should have the range dial set to 50 meters (between the 0 and the 1) and the windage set to "0". Take aim at a target and fire the rifle. If the results are not dead on (see figure below) then you will need to adjust the reticle.


Target
If your shot hits here and you can keep the rifle unmoved. Bring the reticule up to where the shot hit by the adjustments described in step 2 and 3. Fire again and repeat until reticule is zeroed.
Aiming reticule

To move the reticle to the shot (assuming you can keep the rifle in the same position as you make adjustments - otherwise trial and error will do the same thing...just take more ammo) you have to loosen the two silver screws on each dial. Loosen the screw but do not remove them. As an example we will walk through the above example. We need to move the reticle over to the right since the rifle is hitting to the right. Rotate the windage dial clockwise until the reticle is approximately under the bullet hole when looking through the scope (make sure the silver part of the dial with the numbers on it does not move (I had to hold the range dial with pliers)). If you have to pick up the rifle to do this or otherwise can't keep it on target you will have to do guess work when

moving the reticle. This may cause you to overcompensate but several iterations of firing and adjusting should zero the rifle. Then rotate the range dial counterclockwise to raise the reticle. Once you believe that you are close to where the bullet hit, screw the silver screws back in and repeat firing the rifle. Repeat this process until the rifle is zeroed. When you have a good zero at 50 meters set the range to "1" and move the target to 100 meters. Fire again to confirm your zero is still good. You should only have fine tuning to do at this point but you may have to repeat the above steps to refine the settings. Now go shoot something with confidence!

Since the silver dial is set correctly, rotate the black top after loosening the screws until the reticle is where you want it.
Prevent the silver part of the dial from moving.

Step 3: If you believe you have an adjusted sight (but the dial numbers are not on 50 meters for range and "0" for windage then proceed as follows. Take aim at a target at 50 meters. If you hit the bull's eye then you need to only change the silver dial position. If however the sight needs further adjusting rotate the dials per the instructions in step 1 to bring the reticle to the bullet hole. Once you have the sight zeroed unscrew the silver screws for range and windage (assuming both need fixing - see figure below). Rotate the SILVER portion of the dial until it is at the correct setting (i.e. 50 meters for range and "0" for windage). Prevent the black top from moving or you will move the reticle thus ruining the zero. Once you have a good zero at 50 meters move the target out to 100 meters and repeat the process. You should only have minimal changes to make.

Dragunov/POSP zeroing:

Set the range to 1 to test fire at 100 m. There are half marks between the numbers which correspond to 50 m. After you test fire, loosen the silver screws (not the black center screw) and rotate the dial to move the reticle up or down to zero the reticule.
Range: Rotating the dial clockwise moves the reticle down (for elevation). Secure the scope on a solid base and move the reticle to match your entry point for the test-fire round. Be sure to tighten the silver screws between each test-fire round. Be sure not to let the silver part of the dial rotate when adjusting the top black dial.
Don't unscrew the center screw
Loosen the side screws to adjust
Rotating clockwise will move the reticule down
Decreasing range
Increasing range
Set the sight at "1" for a 100 m distance.
Each number represents 100 m and the half-marks are 50 m

Windage:

To zero the sight with the elevation at "1" and the windage at "0" just zero the scope by test firing several rounds at your local range. Once you've zeroed the scope then loosen the 2 silver screws (don't remove them completely) and pick up the dial and turn it so the elevation sits on "1" and the windage on "0".
Don't unscrew the center screw
Windage: Clockwise moves the reticule to the left

RETICULE FOR 7.62X39

Rangefinder

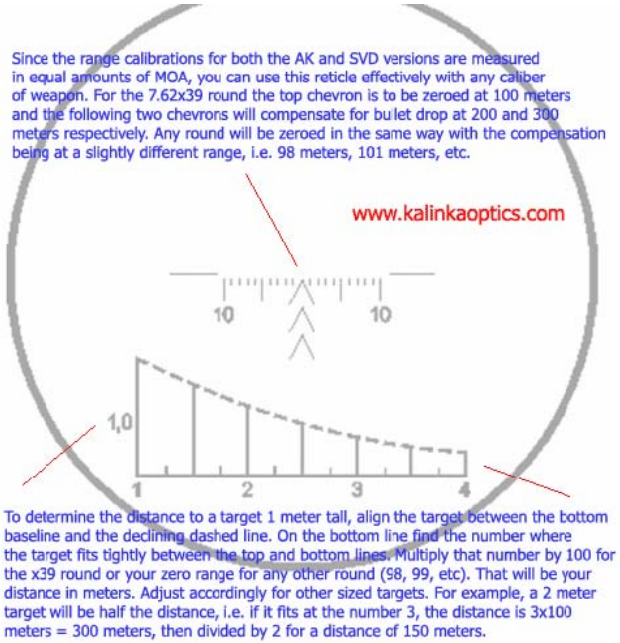
The rangefinder works by placing the target (1 m or 3'4" in height) between the horizontal and the top reclining line with numbers. On the reclining line locate the number closest to the point where the target touches the line. Multiply that number by 100; this is the distance to the target in meters. 1meter = 1.11 yards.

Aiming Chevrons

The chevrons designed for aiming at 100, 200 and 300 meters for the 1st 2nd and the 3rd chevron accordingly.

Windage

Windage scale can be used to make horizontal adjustments or as a rangefinder. Shifting the aiming point by one division left or right will move the point of impact by 10cm / 4" for every 100m / 333 ft of the distance. The distance to the target can be determined by assuming that a 1m / 3'4" wide/long object fits between the small divisions at 100 m / 333 ft.


Since the range calibrations for both the AK and SVD versions are measured in equal amounts of MOA, you can use this reticle effectively with any caliber of weapon. For the 7.62x39 round the top chevron is to be zeroed at 100 meters and the following two chevrons will compensate for bullet drop at 200 and 300 meters respectively. Any round will be zeroed in the same way with the compensation being at a slightly different range, i.e. 98 meters, 101 meters, etc.
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10
10
1,0
1
2
3
4
To determine the distance to a target 1 meter tall, align the target between the bottom baseline and the declining dashed line. On the bottom line find the number where the target fits tightly between the top and bottom lines. Multiply that number by 100 for the x39 round or your zero range for any other round (98, 99, etc). That will be your distance in meters. Adjust accordingly for other sized targets. For example, a 2 meter target will be half the distance, i.e. if it fits at the number 3, the distance is 3x100 meters = 300 meters, then divided by 2 for a distance of 150 meters.

Using the scope

While aiming you must put your eye on the optical axis of the scope so the image appears flat and without shadows on the edges. Using the rubber eyepiece will help you to properly align your eye on the optical axis and ensure the proper eye relief. Use the extendable shade available on some models for shooting at bright daylight conditions to prevent sunshine directly striking the objective lens and preventing excessive glare.

Aiming and shooting at fixed targets.

Adjust the elevation turret or chose the appropriate chevron with respect to the range to the target. Assuming there is no cross wind, keep the windage turret at the "0" position.

Aiming and shooting at moving targets

While shooting at moving targets it is necessary to aim ahead of the target. To determine how far the aiming point has to be taken out you'll need to estimate the speed of the target and the distance to it. The faster the target moves and the further the distance to it the further ahead you'll have to aim. Have the moving target aligned with horizontal hairs of the reticle as you aiming.

SAFEKEEPING

Avoid hard strikes to the scope or dropping it. After using the scope in wet conditions wipe it with dry soft cloth and live it to dry out at a temperature not exceeding 112 F°. To protect the glass surfaces of the scope always use objective lens and eyepiece cups when the scope is not in use. When not in use keep the scope in a dry place at room temperature with humidity not exceeding 80%.

NEVER ATTEMPT TO FIX THE SCOPE YOURSELF OR TAKE IT APART FOR WHATEVER REASON. VIOLATION WILL VOID THE WARRANTY.

WARRANTY

The scope meets or exceeds the quality standards set forth by the manufacturer and its technical specifications match those listed in this manual. The scope carries a 12 month limited warranty against manufacturing defects from the date of sale. If the scope fails during the warranty period the customer is entitled to have the scope repaired of fixed at the discretion of Kalinka Optics. Each party is responsible for shipping cost of the scope at their end. The scope must be shipped to Kalinka Optics per the return/warranty policies set out at www.kalinkaoptics.com. Absolutely no returns or warranty claims will be processed without a Return Authorization Number, see the site for details. If maintenance or feasible and justifiable repairs have to be done upon expiration of the warranty period, all costs related to these services is responsibility of the customer.

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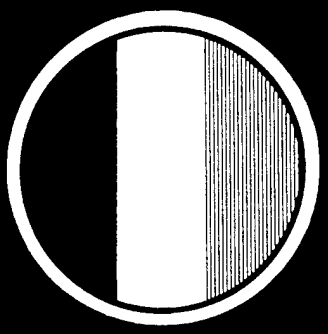

- WEAPONS
- TACTICS
- TRAINING

SOVIET RPG-7 ANTITANK GRENADE LAUNCHER

NOVEMBER 1976

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This bulletin will focus on the RPG-7 antitank grenade launcher, the most numerous and widely distributed of all the Soviet antitank weapons. Introduced in 1962, is is now the standard Soviet and Warsaw Pack squad antitank weapon (except in Czechoslovakia which has a weapon of its own design similar to the older Russian RPG-2). The RPG-7 has been a standard weapon in the Israeli inventory since 1967. It has been used in Northern Ireland where it has been reportedly fired from *inside* buildings.

Of all the Soviet antitank weapons, the RPG-7 is probably the best known to U.S. commanders. In Vietnam its efficiency in all types of combat, including fire at helicopters, was well established after its introduction in 1967.

This bulletin describes the RPG-7: how it works, the capabilities and weakness of the weapon, its crew training and its tactical employment. These factors provide considerations for developing effective countermeasures against the RPG-7 and, finally, thoughts on training to insure countermeasures are learned before the battle starts.

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BULLETIN NO. 3[U]

SOVIET RPG-7 ANTITANK GRENADE LAUNCHER
Capabilities and Countermeasures

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This TRADOC BULLETIN is intended to provide to commanders, and others concerned with military training, timely technical information on weapons, tactics, and training. It is not intended to supplant doctrinal publications, but to supplement material on "how to fight" with data derived from tests, recent intelligence, or other sources, which probe "why."

TRAINERS' NOTE: The format of this bulletin is designed to help trainers identify and extract needed information. TASOs have master copies of the diagrams and pictures in this bulletin, from which you can order slides for use in unit schools or other training.

Comment or critism is welcome, and should be directed to:

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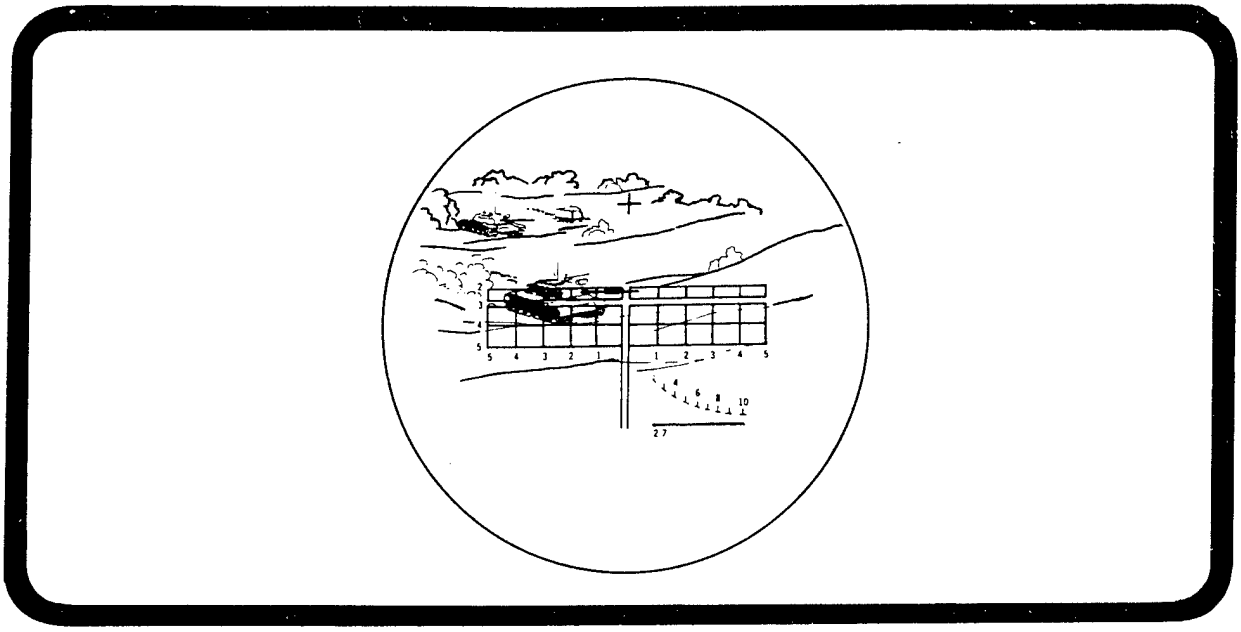


I
THE SOVIET RPG-7 ANTITANK GRENADE LAUNCHER

Soviet doctrine for the modern battlefield is identical to American doctrine in one important way. Both doctrine stress that the tank, because of its armor, speed, fire power, and relative invulnerability to nuclear weapons, is necessary for decisive offensive combat. Since main battle tanks are roughly equal in capability, the force that can maintain the greatest number of tanks on the battlefield has the dominant edge in mobile warfare. Hence, both forces seek to reduce the number of opposing tanks as a prerequisite for their own success and have developed an array of powerful antitank weapons. The effectiveness of Soviet antitank weapons was clearly shown in the Arab-Israeli conflict of 1973. But that war also proved that each system can be degraded or nullified by sound tactics, by an understanding of the weapons, and by aggressive and imaginative commanders in the field.

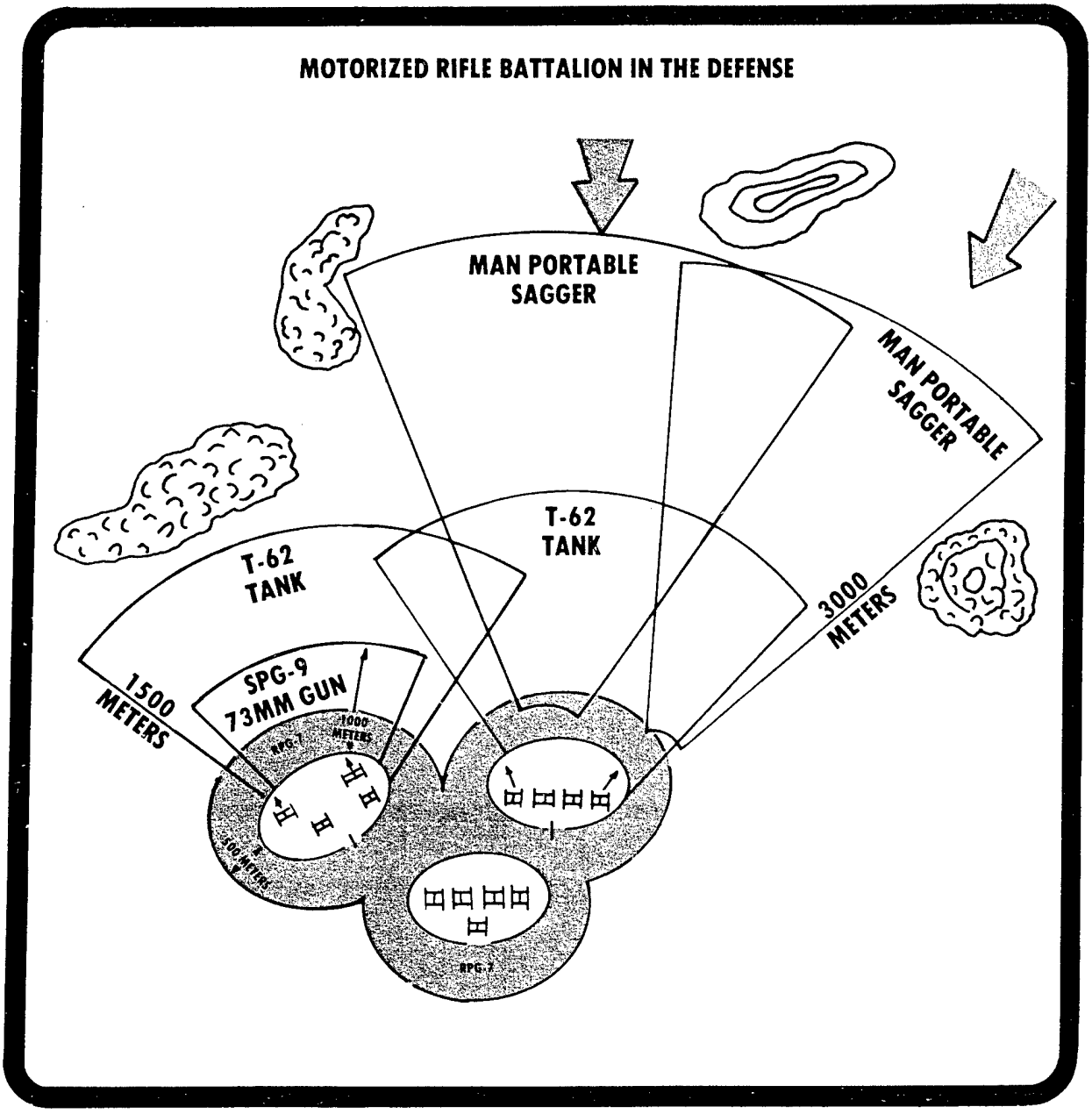
TRADOC Bulletin TWO discussed the longer range SAGGER and SWATTER antitank guided missile (ATGM) systems. This bulletin will focus on the RPG-7 antitank grenade launcher, the most numerous and widely distributed of all the Soviet antitank weapons. Introduced in 1962, it is now the standard Soviet and Warsaw Pact squad antitank weapon (except in Czechoslovakia which has a weapon of its own design similar to the older Russian RPG-2). The RPG-7 has been a standard weapon in the Israeli inventory since 1967. It has been used in Northern Ireland where it has been reportedly fired from *inside* buildings.

Of all the Soviet antitank weapons, the RPG-7 is probably the best known to U.S. commanders. In Vietnam its efficiency in all types of combat, including fire at helicopters, was well established after its introduction in 1967.

This bulletin describes the RPG-7: how it works, the capabilities and weaknesses of the weapon, its crew training and its tactical employment. These factors provide considerations for developing effective countermeasures against the RPG-7 and, finally, thoughts on training to insure countermeasures are learned before the battle starts.

The Soviet Antitank Defensive System

The following diagram portrays in a basic way what the Soviets call a "zone of continuous antitank fire." Each weapon complements and supports another weapon to provide coverage throughout the battalion defensive zone. Note that the RPG-7 serves as the final defensive anchor completely around the position. The RPG-7 is backed up with antitank hand grenades that are effective out to 25 meters. Similar weapons and tactics will be used by other armies which have been trained by the Soviets.



II
ANALYSIS OF THE WEAPON SYSTEM

The battlefield effectiveness of a weapon relates to the three elements of the weapon system. These are:

- **Weapon Capabilities**
- **Gunner Proficiency**
- **Tactical Employment**

If we understand each of these parts and their inter-relationship we can begin to:

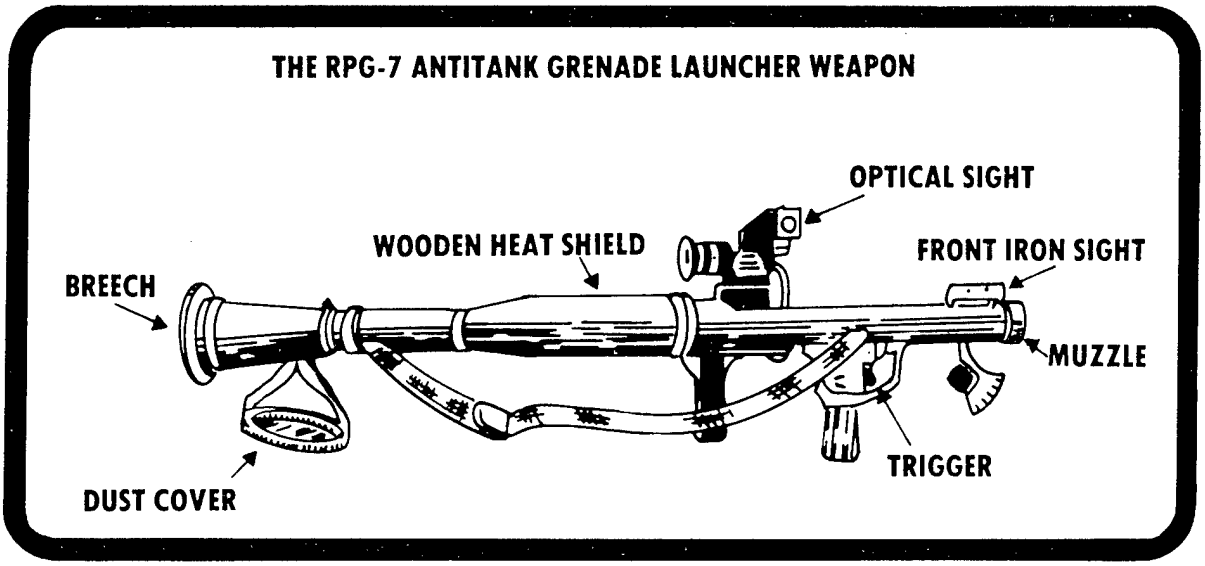
- **Predict lethality**
- **Discover vulnerabilities**
- **Devise countermeasure**
- **Train to defeat the weapon before the battle starts**

Weapon Capabilities

All weapons have certain important design capabilities that can be scientifically measured. Some of these are:

- **Minimum Range**
- **Maximum Range**
- **Range Dispersion**
- **Velocity**
- **Penetration Capability**
- **Operator Safety Distances**

These features are built into the weapon and remain relatively constant. They are starting points. True combat capability is realized only when these effects are considered in combination with battlefield conditions and gunner training.



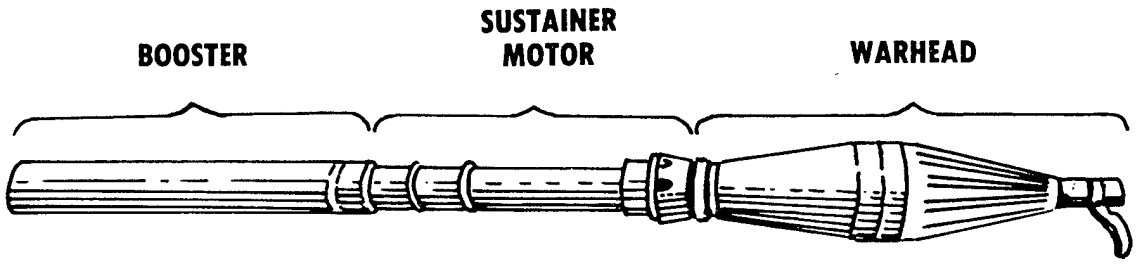
Airborne Model (RPG-7D)

The RPG-7D is a modified launcher designed for airborne troops. It can be broken down into two parts and jumped in on a parachute assault. It is otherwise identical to the basic RPG-7 launcher.

Although the RPG-7 is not identical to the U.S. LAW, its function in battle is similar and a comparison of characteristics between the two weapons is useful.

The RPG-7 is an assigned weapon while the LAW is classified as a round of ammunition and can be issued in quantity.

CHARACTERISTICS	RPG-7	LAW
Length	37.8 inches (unloaded) 52.6 inches (loaded)	26 inches (closed) 35 inches (extended)
Weight		
Unloaded	14.5 pounds	
Loaded	19.0 pounds	5.2 pounds
Caliber		
Tube	40mm	66mm
Round	85mm	66mm
Rate of Fire	4-6 rounds per minute	
Range		
Arming	5 meters	9 meters
Sighting Range (Max.)	500 meters	350 meters
Maximum Range	900 meters — Self destructs	1000 meters
Velocity		
Initial	117 meters per second	144 meters per second
Rocket Assist.	294 meters per second	
Armor Penetration at zero degrees	13 inches	14 inches
Type Warhead	HEAT	HEAT
Lead Capability	20 miles per hour	15 miles per hour
Tracer Element	Yes	No



PRELAUNCH

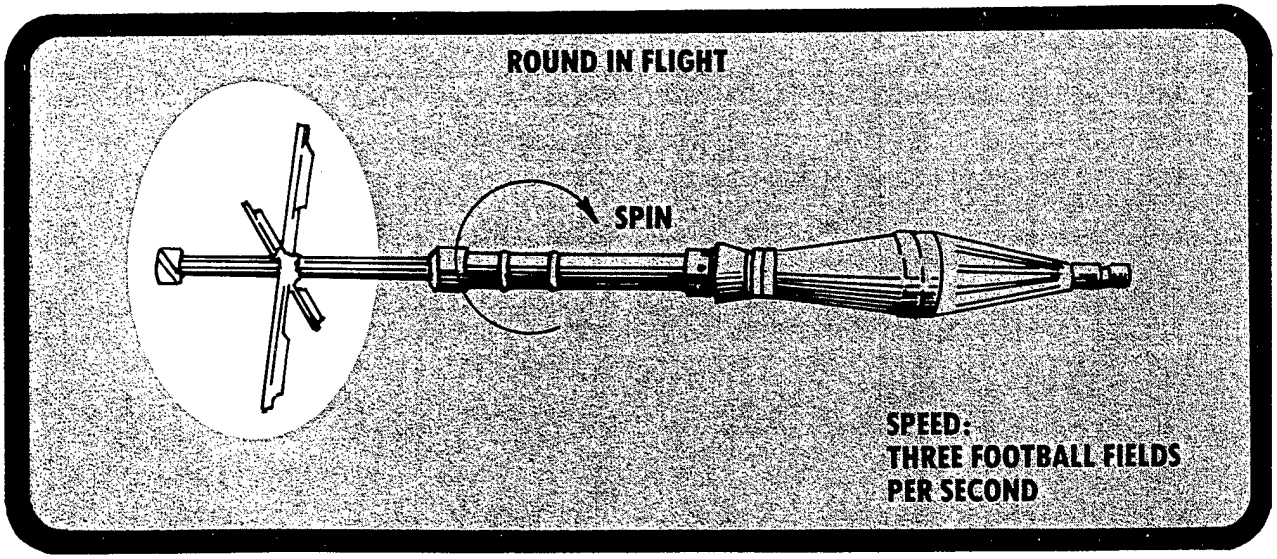
The grenade is carried in two parts: (1) Warhead and sustainer motor and (2) Booster charge. The two parts must be screwed together before the grenade is ready to fire.

The PG-7 grenade is a rocket assisted projectile. It is first ejected from the launcher at a velocity of 117 meters per second by a small strip powder charge. This reduces backblast and protects the gunner. Approximately 11 meters from the launcher a sustainer rocket ignites and boosts the rocket to a maximum velocity of 294 meters per second. Thus the RPG-7 combines the advantages of reduced backblast with increased accuracy and range.

Accuracy is enhanced by a set of fins that open after initial launch. These fins have a canted surface which spin the rocket and provide improved stability in flight.

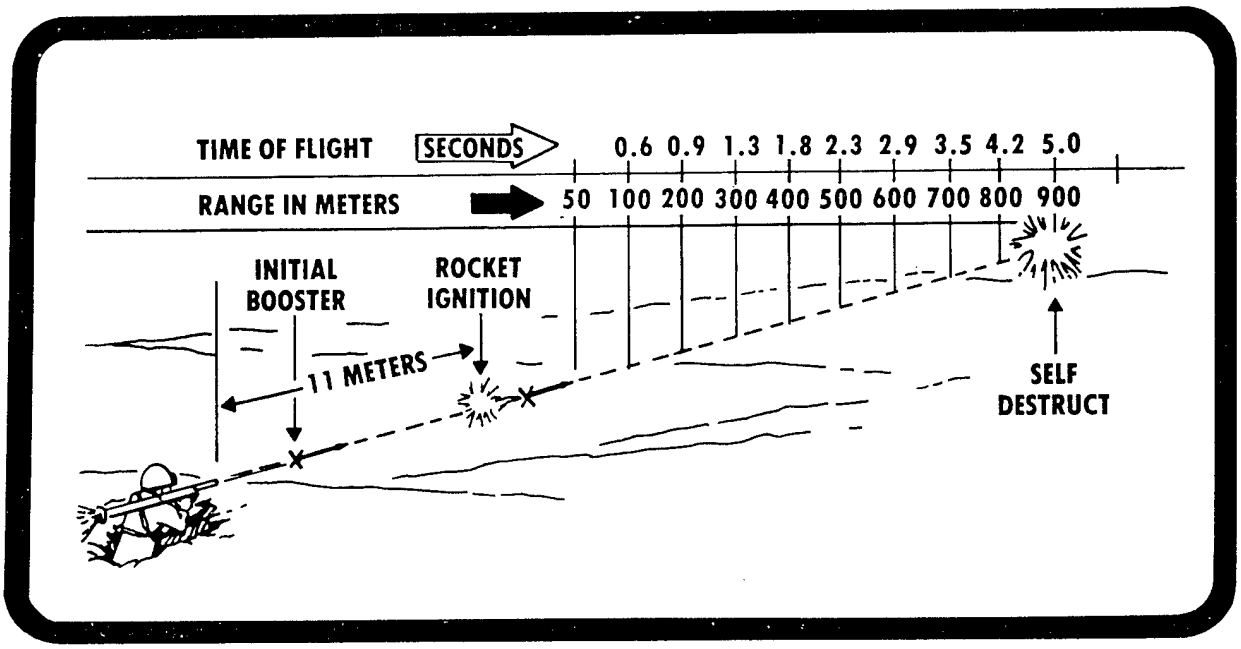
PG-7 GRENADE CHARACTERISTICS

Length	—	36.62 inches
Weight	—	4.6 pounds
Color		
HEAT	—	Olive drab
Practice	—	Black
Type Fuse	—	Point Impact with base detonator
Propellant	—	Smokeless Powder
Spin Stabilized	—	Yes



Firing Signature

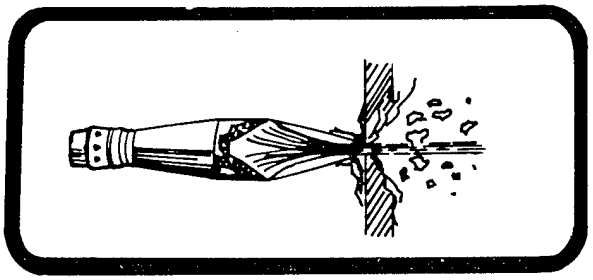
Tests have shown that the smoke from the initial firing backblast is slightly larger than that of the US M72A2 LAW. The initial booster produces a smoke puff 3 to 4 feet in diameter which lingers up to eight seconds in low winds. The sustainer rocket ignites about 11 meters from the launcher and produces a bright flash and a second smoke puff similar to the initial blast. The possibility of locating a RPG-7 from its firing signature is of course dependent on battlefield conditions. Smoke and wind will reduce the initial backblast smoke, but in a position in woods or some cover, the smoke will stay longer. The flash and smoke from the sustainer motor will probably be more visible and provide a general indication of weapon type and location, particularly at night.



Note: The PG-7 grenade self-destructs approximately 900 meters from the launcher.

Killing Effects

The warhead uses the shaped charge effect to penetrate the target. When the warhead is detonated, a small core of metal forms and burns through the armor. There is no explosive action after the core penetrates and often the core will continue out the other side of an APC.

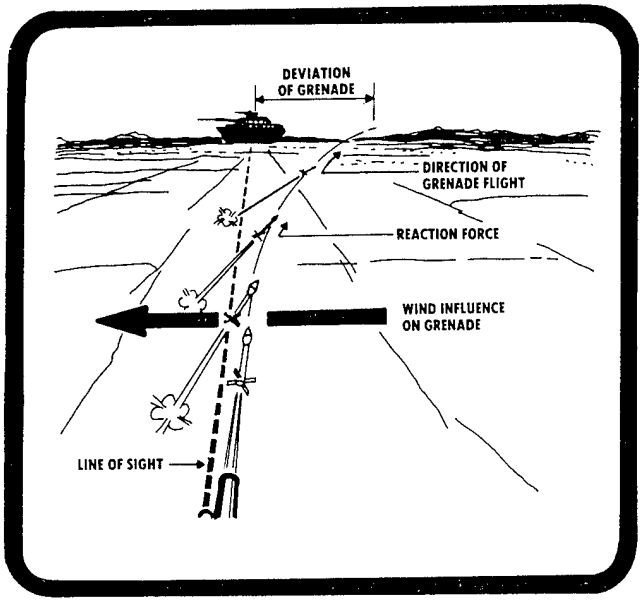


The RPG-7 Sights

Weapon Sights

RPG-7 battlefield effectiveness is directly related to the gunner's ability to aim and fire quickly and accurately. The RPG-7, like most direct fire weapons, is affected by range estimation and by the ease with which the sight can lead a moving target. Further, crosswinds affect the projectile's flight. Normally a projectile, the LAW as an example, will move with the direction of the wind. The PG-7 works exactly opposite from the LAW — the PG-7 grenade flies into the wind.

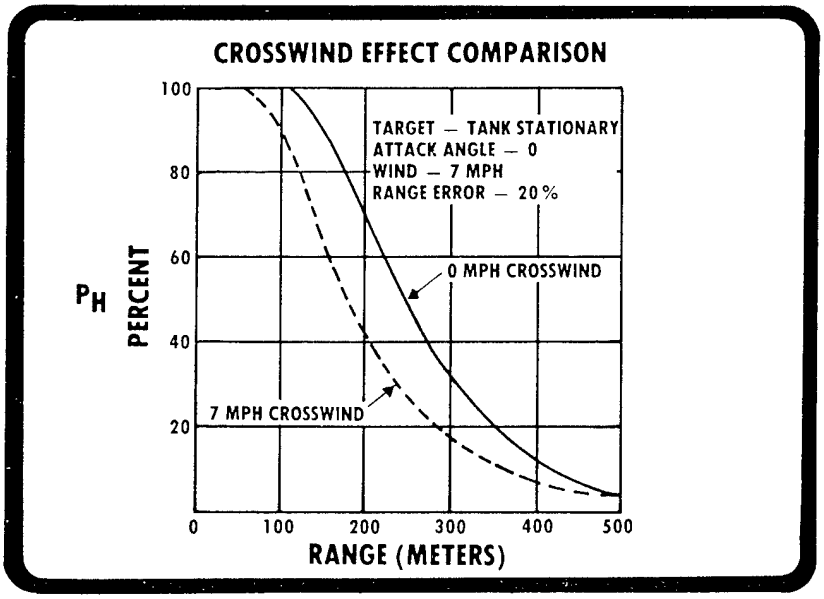
THIS FACT SERIOUSLY COMPLICATES FIRING THE RPG-7 IN CROSSWINDS.



Crosswind Velocity Effects

If he fires into a crosswind, an RPG-7 gunner must correct his sight picture for both wind direction and velocity. The chart below illustrates the average effect on 1st round hits as the wind velocity increases.

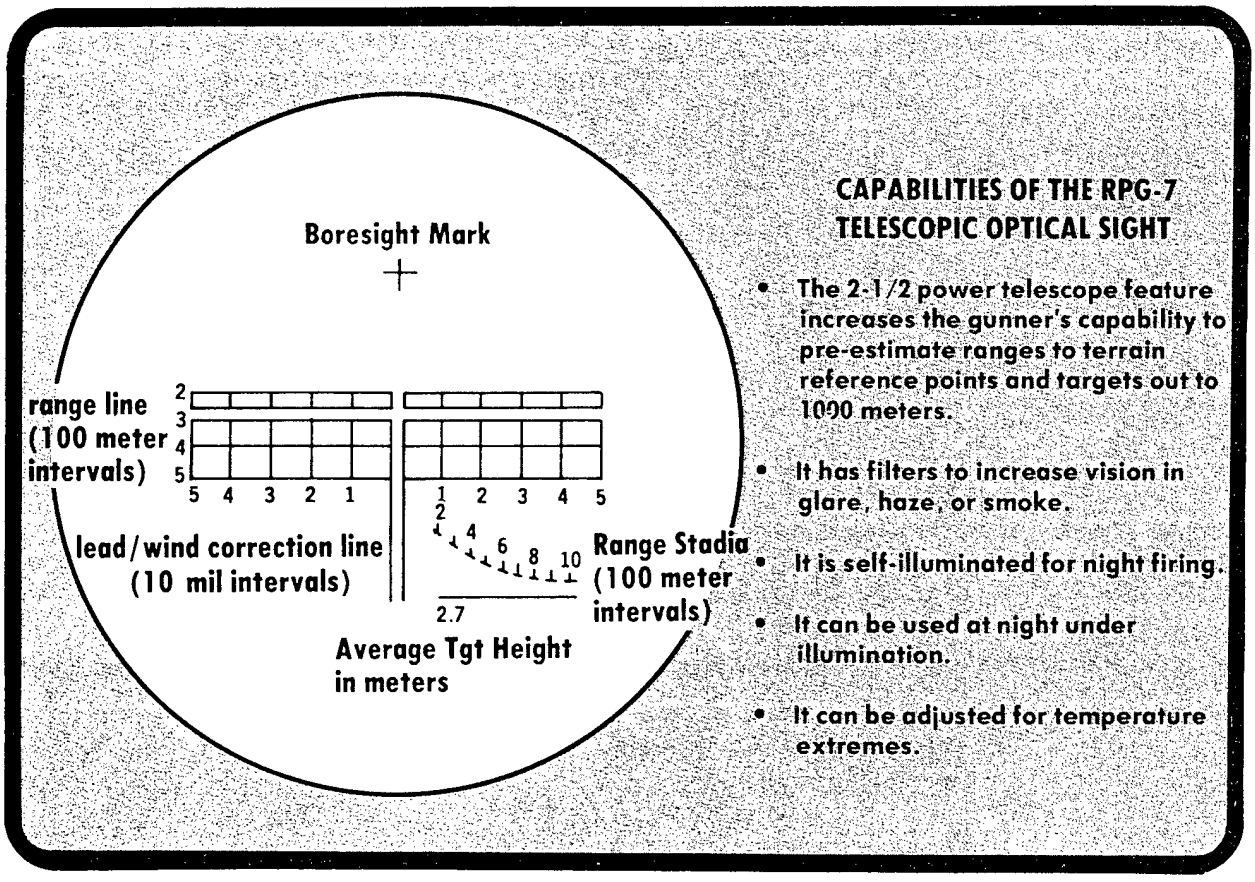
IN A 7 MPH WIND THE GUNNER CANNOT EXPECT TO GET 1ST ROUND HITS MORE THAN 50% OF THE TIME BEYOND 180 METERS.



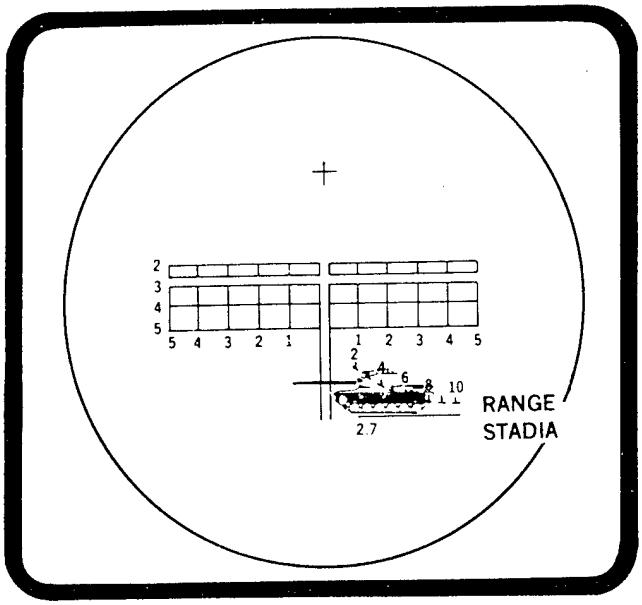
THE RPG-7 HAS TWO STANDARD SIGHTS:

- Iron sights
  - Permanently attached
  - effective from 200 to 500 meters
  - no wind or lead adjustment
  - the back-up system
- Telescopic sight
  - the primary system

The following illustration shows the various parts of the 2½ power optical sight.


Boresight Mark
range line (100 meter intervals)
2
3
4
5
5 4 3 2 1
1 2 3 4 5
lead/wind correction line (10 mil intervals)
2 4 6 8 10
Range Stadia (100 meter intervals)
2.7
Average Tgt Height in meters
CAPABILITIES OF THE RPG-7 TELESCOPIC OPTICAL SIGHT
• The 2-1/2 power telescope feature increases the gunner's capability to pre-estimate ranges to terrain reference points and targets out to 1000 meters.
• It has filters to increase vision in glare, haze, or smoke.
• It is self-illuminated for night firing.
• It can be used at night under illumination.
• It can be adjusted for temperature extremes.

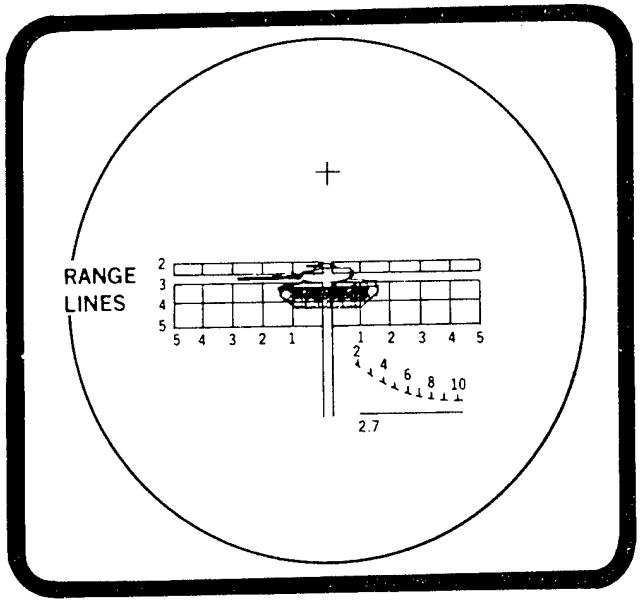
Aiming with the Optical Sight



— Center the full height of the target between the stadia lines. The tank treads rest on the bottom line.

— Read the range, in 100s of meters, on the upper stadia line where the top of the target touches the upper line.

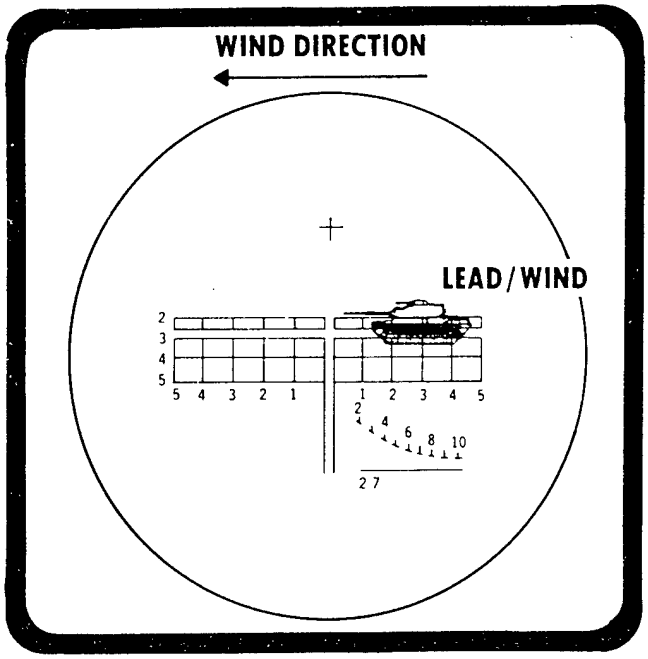
— The target in the example above is at about 300 meters from the gunner.



— Move the center of the sight reticle over the center of the target mass along the line of the measured range.

— The example above depicts a stationary tank at 300 meters.

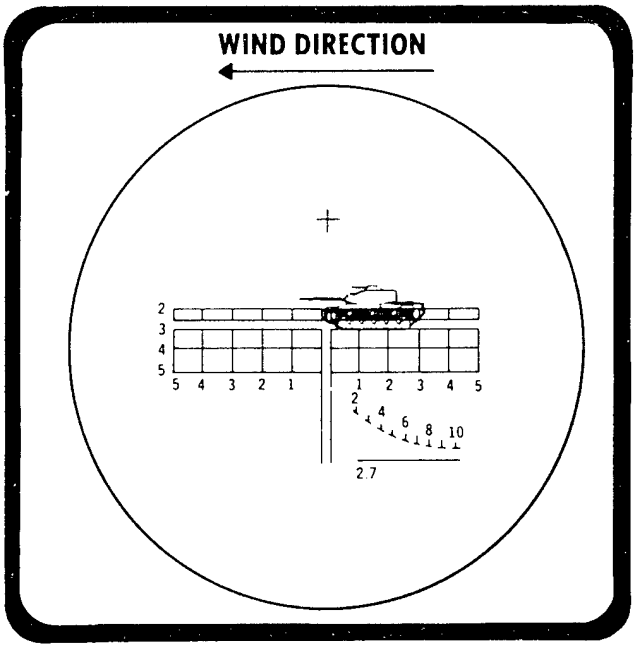
— If there were no cross winds, the gunner could fire with this sight picture.



— If a cross wind is blowing from right to left, move the center reticle to the left of the target. 10 mils for each 10 MPH of wind speed.

— In a cross wind blowing from left to right, move the reticle to the right of the target along the measured range line.

— The sight picture above shows the correction for a stationary target in a wind blowing from the right.



— If the target is moving, establish a lead in the direction of target travel by moving the sight in the direction of travel 10 mils for each MPH of speed.

— For a moving target in a cross wind, the lead is added or subtracted from the wind correction depending on the wind direction.

— The example above depicts a target moving left 15 MPH in a 10 MPH cross wind blowing from the right.

Important Facts About the Sight

Because of the difficulty associated with accurate sighting, sight procedures are covered more extensively than any other subject in the Soviet RPG-7 Field Manual.

- Range stadia measures full target height to obtain range estimate
- Range line is placed over the horizontal center line of the target mass at the measured range. Double line at 300 meters indicates the maximum range that the Soviets expect to get at least 50% first round hits.
- Center lead line is moved first left or right of the target for moving target lead and then again for cross wind corrections.

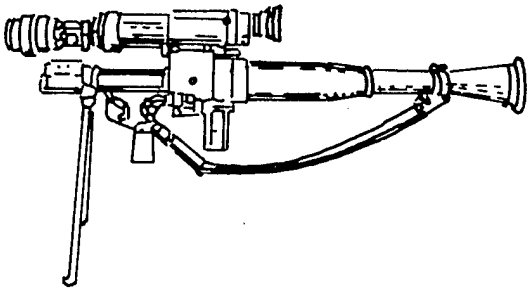
Night Vision Devices

Two night vision devices can be mounted on the RPG-7 launcher in place of the optical sight.

	NSP-2	PGN-1
Type	Active Infrared	Passive-Starlight
Entered Service	1956	1969
Weight	13.23 pounds	7.72 pounds
Distribution	Unknown	One per Motorized Regiment and Airborne Platoon Three per Antitank Battery (SAGGER) One per Division Reconnaissance Bn. One per Regimental Engineer Company
Capabilities (Average target detection range on moonless, starlit night)	150-200 meters	400 meters
	Can passively detect IR sources in excess of 6 km	Can detect small light sources such as cigarettes, flashlight and vehicle instrument panel lights at long ranges

PGN-1 Starlight Scope

The PGN-1 starlight scope was issued in quantity to the Arab forces in the October War, and is designed specifically for the RPG-7 while the infrared sight is used on other small arms.



RPG-7 WITH PGN-1 STARLIGHT SCOPE

Countermeasures

- Light discipline
- Smoke
- Terrain shielding
- Infrared sights can be flooded with illumination
- Careful use of IR and laser range finders—illuminate, move, illuminate, move again

Tactical Implications of the Sighting System

- The optical sight provides good range estimation when it can observe the full target height.
- A tank or APC which does not expose its full height is less vulnerable to accurate range estimation.
- The optical sight can be used at night under illumination.
- The starlight scope enables the gunner to get an accurate sight picture in near total darkness out to 400 meters.
- Light discipline is necessary to avoid long range detection at night.
- The optical sight requires a well trained gunner to put together lead and wind corrections.
- Concealment blocks the gunner's vision.
- Concealment is necessary even at night.
- Smoke is an effective countermeasure.
- A moving target is more difficult to sight accurately.
- To see a target with any sight the gunner must partially expose himself and become vulnerable to counterfire.

RPG-7 Hit and Kill Capabilities

Soviet tactical firing doctrine for the RPG-7 tells the gunner that: "The most effective fire from the grenade launcher is delivered against tanks, self-propelled guns, and other targets of two meters height and more at a point-blank range equalling 300 meters. The sighting range of fire is 500 meters." Combining that doctrine with the optical sight capabilities would produce a sequence of moving target engagements something like this:

— Use the range stadia to estimate target range beginning at the 1000 meter maximum stadia line.

— Begin tracking the target at the 500 meter maximum sighting range.

— Continue tracking until the target reaches the double line at 300 meters and fire.

— Observe the burst, reload, correct for range, and fire a second round if the first round missed or did not kill the target. This takes about 14 seconds.

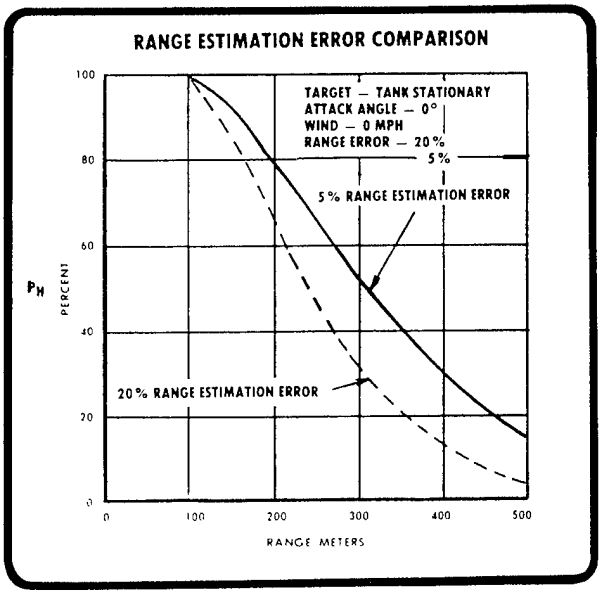
A 300 meter shot reduces target reaction time either to take evasive action or to return suppressive fire. The last point is important to the gunner because even if he hits the target, he probably will require a second shot to kill it.

U.S. analysis of the weapon system indicates that perhaps the Soviet doctrine is overly optimistic. The following series of graphs are based on U.S. exploitation tests and compare Soviet doctrine with U.S. estimates of weapon performance.

Hit Probabilities

Range Estimation Errors

Errors in judging range by an RPG-7 gunner have a significant impact on his chances of hitting a target with the first round. Note the difference in probability of hit at 300 meters against a stationary target with no crosswinds as shown in the graph below.



Considerations

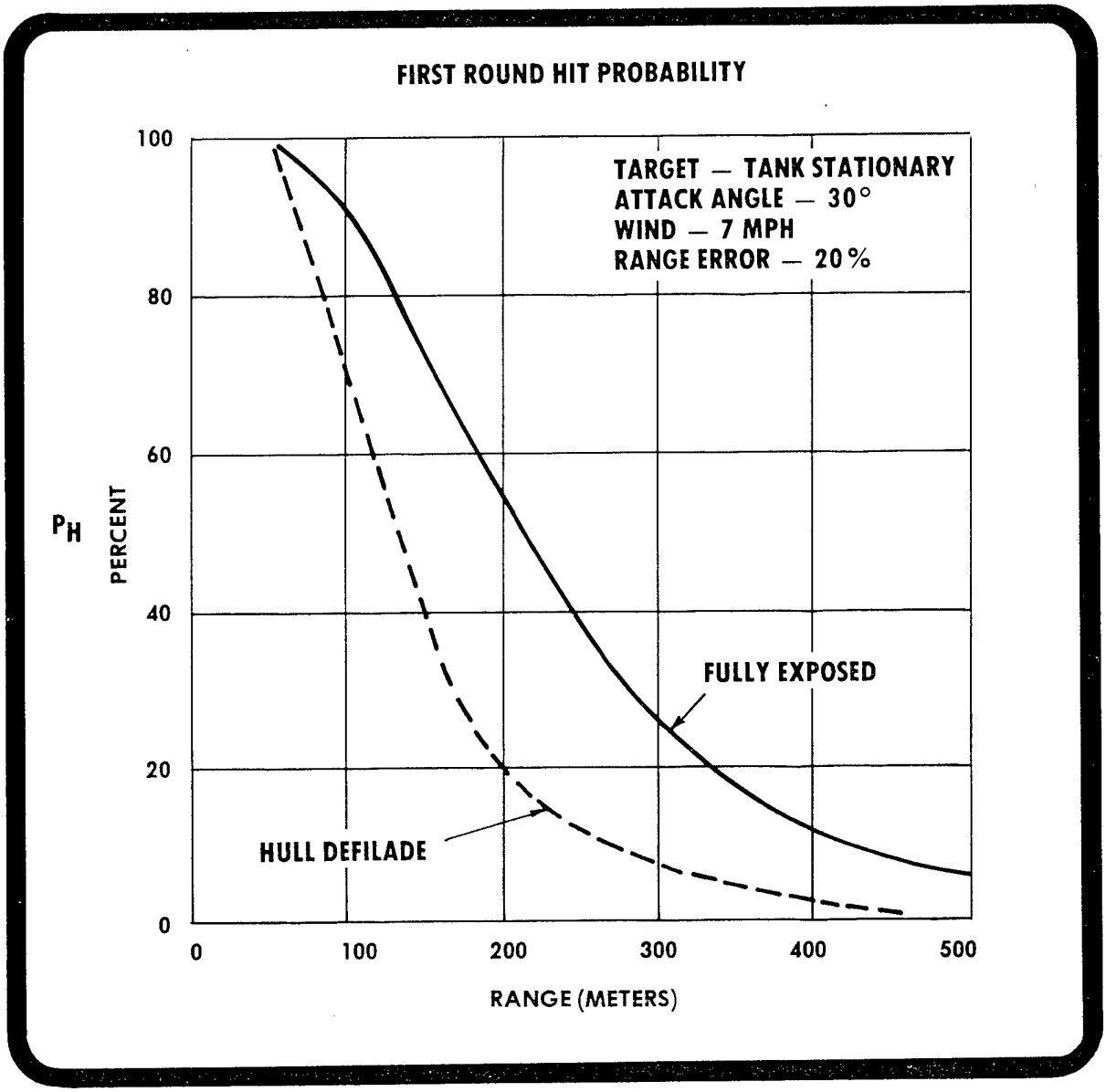
— Range estimation is more difficult for targets in defilade

— Well trained gunners normally misjudge range by about 15% to 20% on the first shot

— 2d round range error will be much lower because the gunner can correct using burst on target methods

1st Round Hit Probability vs. M60 Tank — Stationary

1st round hit probability at 300 meters is much lower than Soviet expectation: an exposed target at this range has less than a 30% chance of being hit with the 1st round.



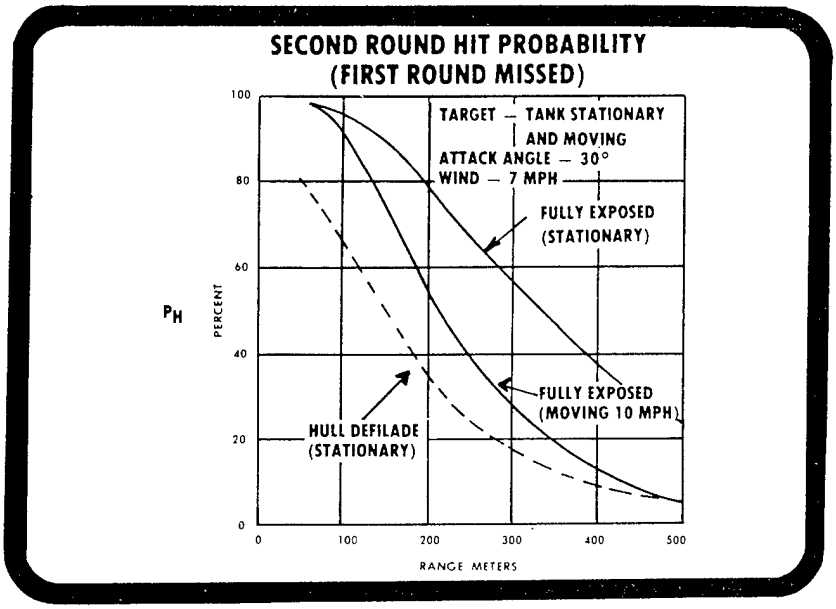
AT 300 METERS THE CHANCE OF HITTING A FULLY EXPOSED TARGET IS 4 TIMES THAT OF HITTING A TARGET WHICH STOPS IN HULL DEFILADE.

NOTE: 1st round hit probability is essentially the same for both stationary and moving targets because range errors and crosswind correction problems override target movement errors.

2d Round Hit Probability vs. a Tank — Moving and Stationary (1st Round Missed)

A gunner who is allowed to fire a second shot can make a range correction and will be significantly more accurate: at 300 meters he has better than a 50-50 chance of hitting an exposed stationary tank.

AT 300 METERS THE CHANCE OF HITTING A FULLY EXPOSED STATIONARY TANK IS ABOUT TWICE THAT OF HITTING AN EXPOSED TANK MOVING AT 10 MPH, AND 3 TIMES THAT OF HITTING A TANK STOPPED IN HULL DEFILADE.

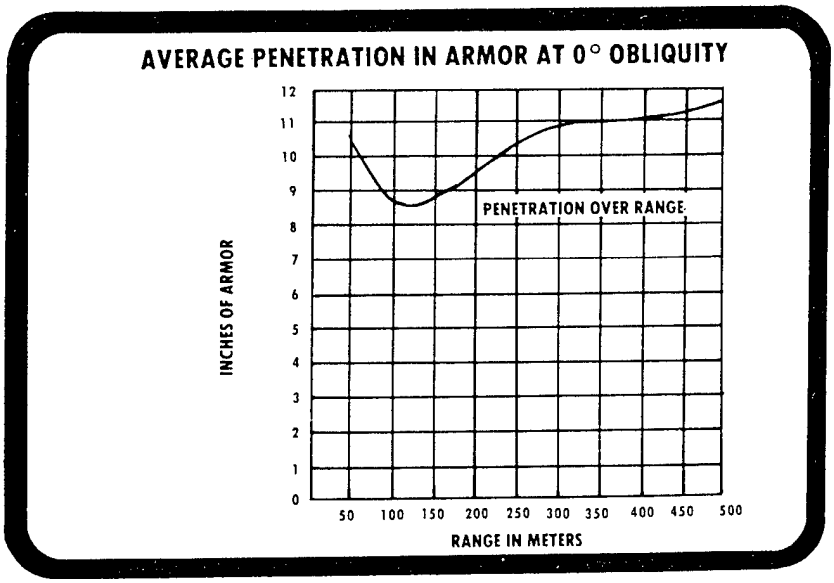


Kill Probability

Hitting a target is only part of the gunner's problem. Even if the round hits, the shaped charge has to penetrate the armor and cause enough damage to the vehicle or to the crew to stop the tank and prevent it from shooting back even if stopped.

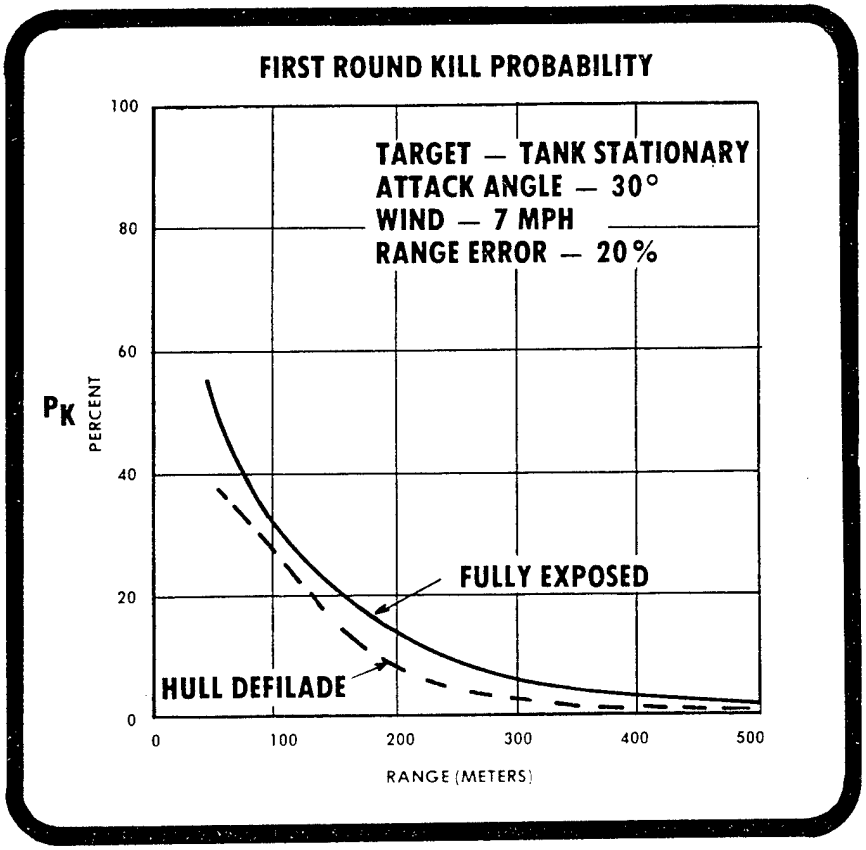
The RPG-7 warhead can punch a hole 2 inches in diameter through more than 11" of armor. When it penetrates, hot metal fragments from the armor are scattered violently around the inside of the vehicle and can cause personnel casualties and ignite ammunition and fuel.

SOME RPG-7 ROUNDS WILL PENETRATE UP TO 13 INCHES OF ARMOR, BUT ON THE AVERAGE, PENETRATION IS LESS THAN 11 INCHES IN ROLLED HOMOGENOUS STEEL AT 0° OBLIQUITY. THE FOLLOWING CHART ILLUSTRATES THE CHANGE IN PENETRATION OVER RANGE.



Probability of a 1st Round Kill vs. a Stationary Tank

Although the probability of a 1st round hit is relatively high, the probability of getting a 1st round firepower or mobility kill against a tank is somewhat lower because of warhead effects after penetration.



AT 300 METERS THE CHANCE OF KILLING A FULLY EXPOSED TANK IS TWICE THAT OF KILLING ONE THAT STOPS IN HULL DEFILADE; HOWEVER, KILL POSSIBILITY IS SMALL FOR BOTH CONDITIONS.

Tactical Implications

- An exposed stationary tank or APC is at least 2 times more vulnerable than a stationary target in hull defilade.
- A moving target gains some protection.
- React immediately when fired at by an RPG-7. A second round will probably hit, even if the first one missed.
- Make the gunners sighting problems tougher. If he cannot see, he cannot aim.

  — suppress with machine guns
  — obscure his vision with smoke, darkness, or concealment
  — keep moving

Penetration of Other Materials

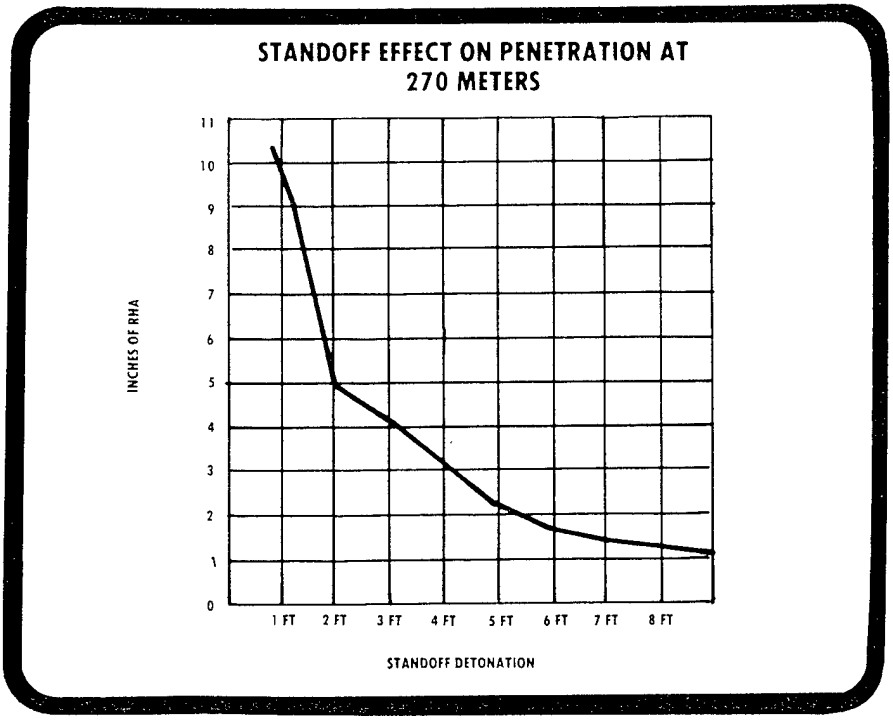
The RPG-7 can penetrate other materials such as sandbag bunkers and concrete buildings, but the round is *not* a wall-buster. It will put a hole up to 2 inches in diameter through a concrete or brick wall, but will not knock it down. It can be effective in urban warfare against troops located in buildings. For example, in Vietnam, during the battle for Hue in 1968, two U.S. Marine battalion commanders stated that the RPG-7 was the most dangerous weapon encountered over the entire battle.

PENETRATION IN OTHER MATERIALS

Material	Inches
Sandbags	90"
Reinforced Concrete	18"
Earth Log Bunkers	60"

The Stand-off Countermeasure

If the round can be detonated *before* it hits the target, penetration is reduced according to the distance of the stand-off detonation. The following graph relates the effect of stand-off versus tank armor using hit range of 270 meters. The round can be detonated by almost any type material, including concertina wire and chain link fencing.

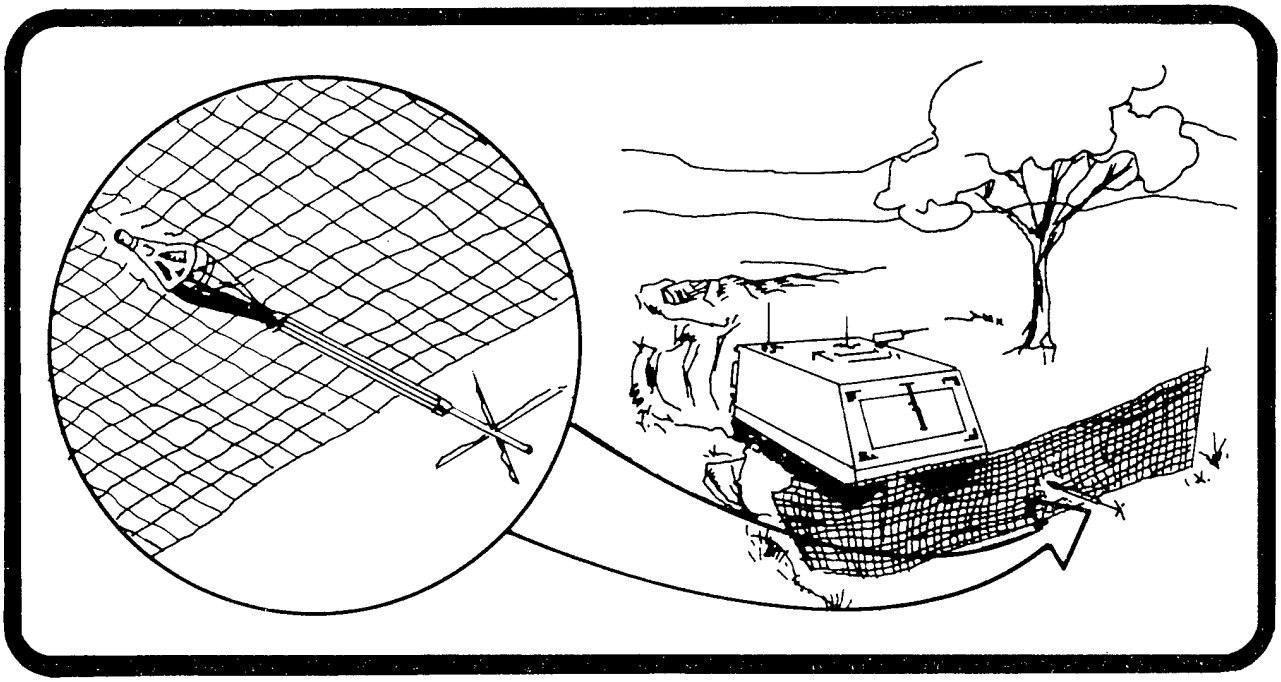


Stand-off Protection to Stop Penetration

Material	Minimum Stand-off Distance
M113 Armor	12 FT
4-1/2" Brick Wall	25 FT
6" Concrete	25 FT

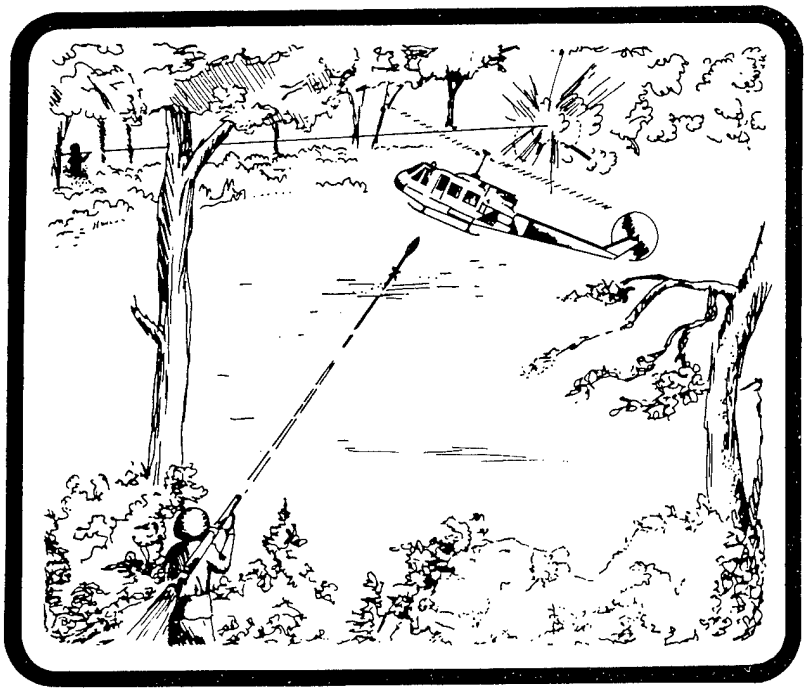
The RPG Screen Countermeasure

The RPG Screen was first used in Vietnam and was designed as a portable stand-off for tanks and APCs. But, in fact, the screen will electrically dud the grenade and prevent any detonation in approximately 50 percent of the rounds fired into it. This happens because the nose fuse of the round can pass through the wire without striking a wire strand, but this will bend metal ogive on the warhead against the inner cone. This cone carries the firing signal from the nose fuse to the base detonator and shorts when the ogive touches the cone. When this happens, the round completely duds.



Effects Against Aircraft

The sighting required for the RPG-7 makes a hit on a moving aircraft or helicopter highly unlikely. However, it could be devastating against a flight of helicopters on final approach or just leaving a LZ if two or three RPG-7's were placed in ambush around the LZ.



Effects Against Personnel

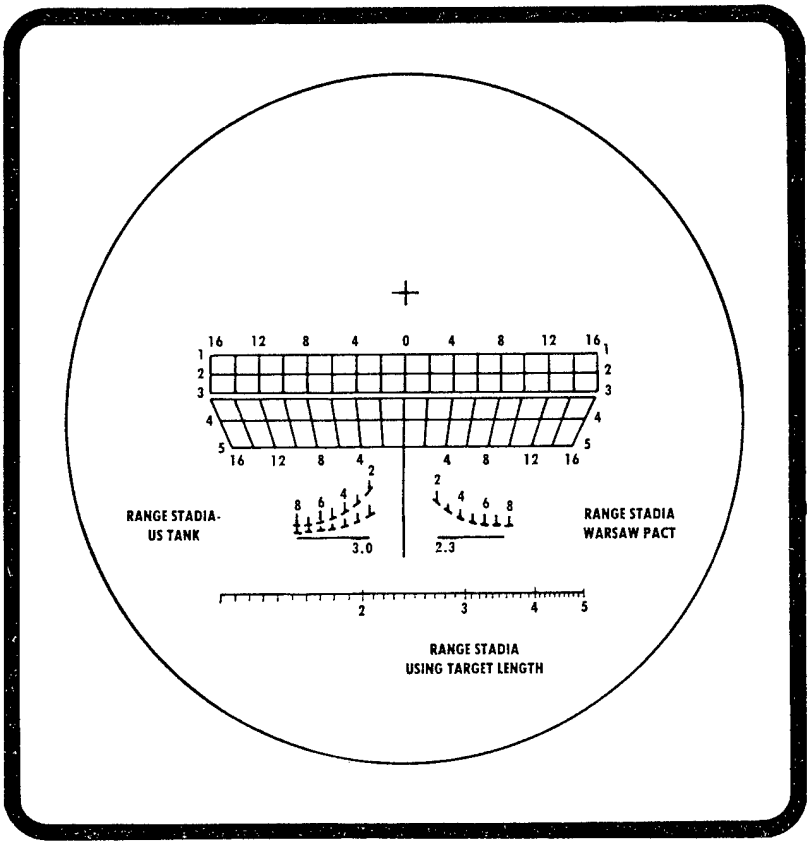
The RPG-7 Heat grenade is not designed for fragmentation effect, but:

- lethal metal fragments from the warhead and rocket can fly as far as 150 meters from the point of detonation.
- soldiers riding on top of tanks and APCs can be hit by round fragments which spray from around the point of impact.
- the round can penetrate through foxhole berms and sandbagged and concrete structures and can reach personnel that are otherwise protected from small arms and artillery fire. Camouflage and concealment provides additional protection for defensive fighting positions.

Improvement Trends

The RPG-7 is an evolutionary improvement of the older RPG-2 which was introduced in 1949. Both weapons use the rocket assist principle and point out the Soviet preference for that method of gaining range and accuracy. The Soviets are thought to be developing an improved rocket-assist antitank weapon to replace the RPG-7 in the 1970s. The newer version will have a 600 meter range capability, versus the 500 meter range for the RPG-7, and the sighting system will be improved.

The Chinese have copied the RPG-7 and modified it for their needs. Their version is 3 pounds lighter than the Soviet model and has improved iron and optical sights. Both of the Chinese sights simplify the crosswind correction problem which, in turn, reduces the training requirements and tends to increase accuracy. The optical sight has two range stadia, one for US Armor and one for Warsaw Pact Armor, and also has an additional stadia for estimating range using target length.



Gunner Training

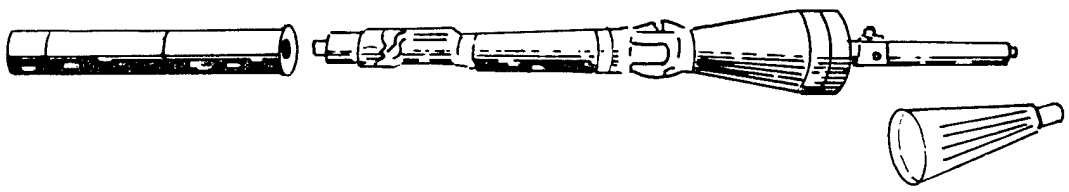
Russian soldiers are normally assigned to the same position for their entire two year service. That fact, coupled with the information on training he receives, indicates that the RPG-7 gunner is well trained in the basics of firing and the tactical use of his weapon. Gunner training includes:

- The RPG-7 gunner is trained to fire rapidly from the prone, kneeling, and standing positions.
- In the offense, the gunner is taught to carry the launcher loaded.
- The assistant gunner is expected to be as competent on the weapon as the gunner.
- Instruction on sighting techniques is detailed and thorough.
- The gunner is taught where to shoot at tanks to hit the most vulnerable areas.
- The crew is taught to avoid prominent terrain features or hillcrests when selecting a firing position.
- The gunner is taught to fire first and foremost at the closest tank to his position and fire only at APCs or other targets when tanks are not present.

The following chart to gauge wind effect highlights the type of useful combat information found throughout the service manual for the weapon.

Objects	Wind		
	weak, (2-3 m.p.h.)	moderate, (4-6 m.p.h.)	strong, (8-12 m.p.h.)
Thread	Deviates inconsiderably	Deviates considerably	Keeps in horizontal position
Handkerchief	Waves and slightly flies	Flies	Hardly held in hand
Smoke from chimney	Deviates inconsiderably	Deviates and drifts	Sharply deviates and breaks
Grass	Waves	Bends to ground	Creeps on the ground
Branches of trees	Branches and leaves wave	Thin branches deviate and leaves wave strongly	Big branches deviate

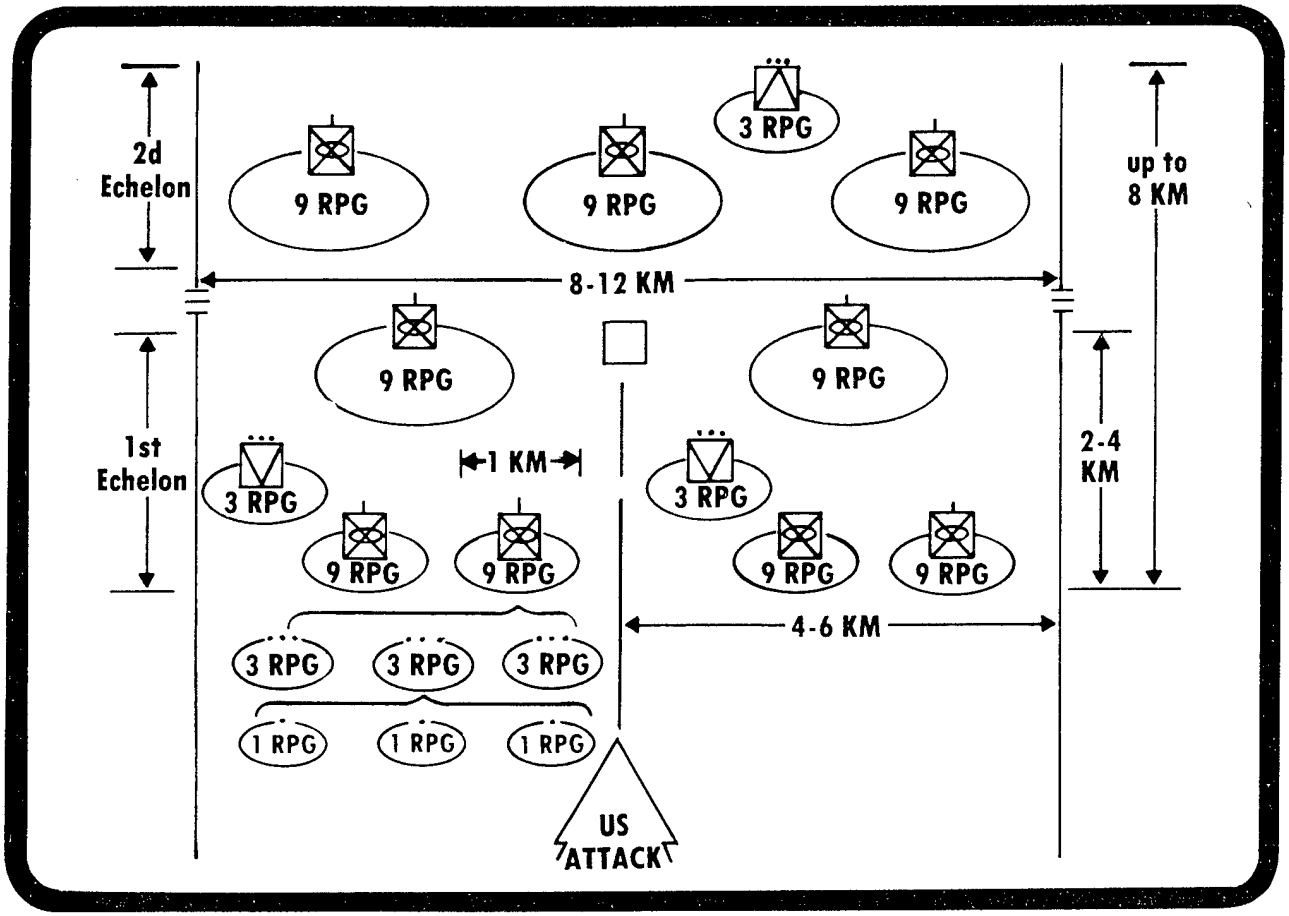
Training aids and devices are also available for training RPG-7 gunner. For example, the 7.62mm subcaliber device is mounted inside a specially adapted RPG-7 rocket assembly.



7.62mm SUBCALIBER TRAINING DEVICE

Weapons Distribution

Every squad in motorized and airborne divisions is assigned one RPG-7. The diagram below indicates where and in what numbers the RPG-7 is located in the Motorized Rifle Regiment in the defense.



There is no handy rule of thumb that will accurately predict what kind of what size unit you have encountered when you are fired at by one or more RPG-7s. They are too widely distributed to do that. It is better to keep this in mind:

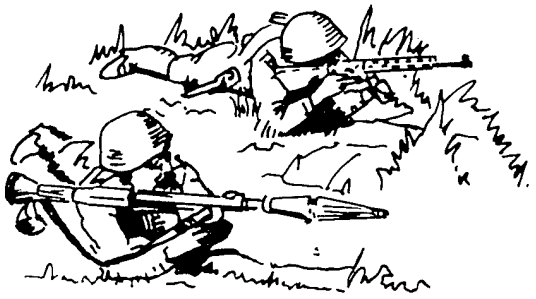
> The RPG-7 is habitually employed as part of an interlocking array of antitank weapons. When you are fired at by larger weapons, you can expect to find RPG-7 supporting those weapons. When you are fired at by RPG-7s, you can expect to receive fire from other antitank weapons.

Tactical Employment

EMPLOYMENT LIMITATIONS

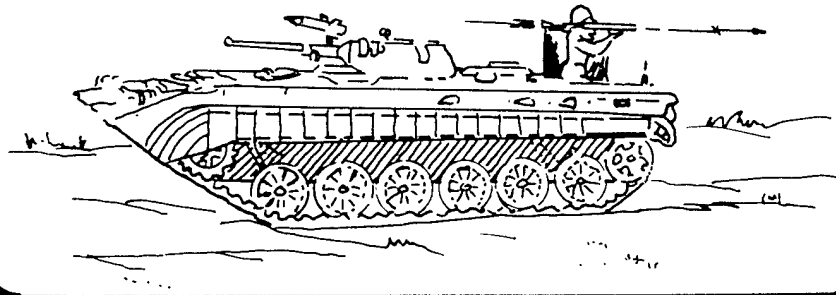
- **Personnel, ammunition, and inflammables must be at least 30 meters behind the breech to avoid the firing back blast.**
- **The breech must clear any solid objects by at least 2 meters.**
- **The launcher muzzle must be at least 8 inches from any cover or fortifications to prevent the grenade stabilizer fins from hitting any object after firing.**

The RPG-7 can be employed in a hasty position either in the offense or defense.

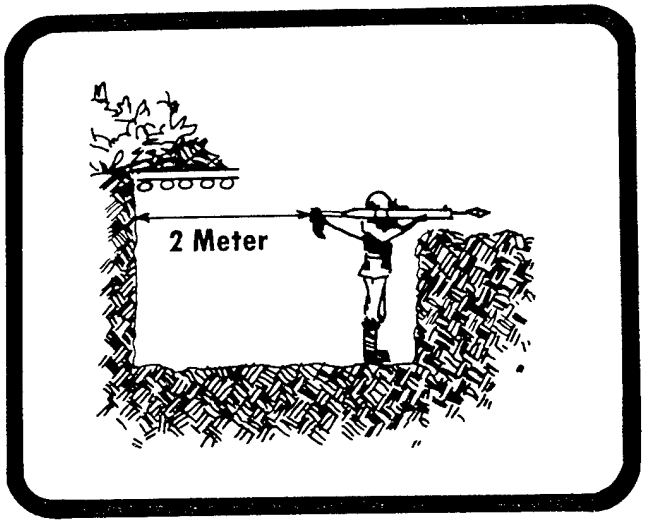


Note: The assistant gunner is located to the left of gunner and protects him with small arms fire. In a two-man crew, the assistant is trained to always deploy to the left of the gunner.

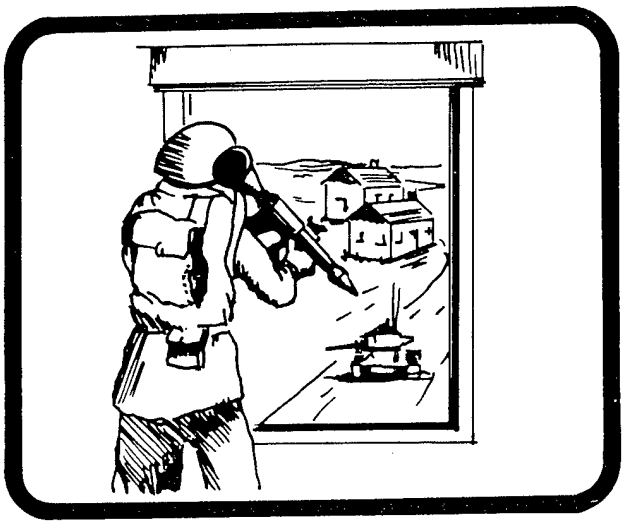
The gunner can fire from the BMP without dismounting.



The RPG-7 can be employed *in* all types of constructed fortifications to include positions with overhead cover and inside buildings.



The gunner needs only the two meter safety distance from the rear bunker wall.



Tests also indicate that the RPG-7 can be fired safely from inside buildings.

The capability to fire from inside buildings has added significance. Increasing urbanization, particularly in Europe, will create more situations for fighting in cities and towns. Thus the RPG-7 must always be considered when moving tanks and APCs through built-up areas where they can be engaged at close ranges from inside or atop buildings.

Tactics for the RPG-7

Soviet tactical doctrines does have certain characteristics that are important in identifying the way RPG-7s will be employed. Some of the more important ones are:

- **All round antitank security on the move.**
- **Company strongpoints on the defense.**
- **Defense in depth.**
- **Use of fire pockets to destroy armor by massed fire.**
- **Integration of motorized infantry with tanks in the defense.**
- **Extensive reconnaissance on both the offense and defense.**
- **Use of company and battalion size airborne forces for deep penetration against rear echelon units.**

Ambush and Tank-Killer Tactics

RPG-7 tank-killer teams are a normal part of Soviet defense tactics. One or more teams could be located on the flank of a defending company and along wood lines to engage armor moving through, or close to, tree covered terrain. You can also expect to find the RPG-7 used in ambushes on both offense and defense. Ambushes may be part of a main defense or can be employed by reconnaissance elements to capture prisoners, destroy nuclear firing sites, or delay advancing forces.

Meeting Engagements and Movements

A reinforced platoon normally leads a battalion. This platoon moves as an advance guard platoon. Therefore, a minimum of three RPG-7s are available to counter the immediate threat in a meeting engagement. The main body will have squads out as flank protection and a company will provide rear security. In a meeting engagement, the leading elements will try to stop the opposing force, while the trailing units conduct a quick attack to the flanks. If the vehicles are forced to halt, the RPG-7s are used to provide a close-in antitank perimeter.

Offense

Soviet units try to attack mounted whenever possible. Motorized squads fire from inside buttoned-up BMPs. The RPG-7 cannot be fired from inside the BMP, but the gunner can engage on the move if he stands up in an access hatch. This makes him vulnerable to suppressive fire and his accuraacy would be seriously degraded. If the attack cannot penetrate or bypass mounted, the unit will resort to a dismounted attack. In addition, dismounted attacks are usually conducted:

- **At night.**
- **When terrain precludes fast movement by tanks and BMPs.**
- **When forced by heavy antitank defenses.**

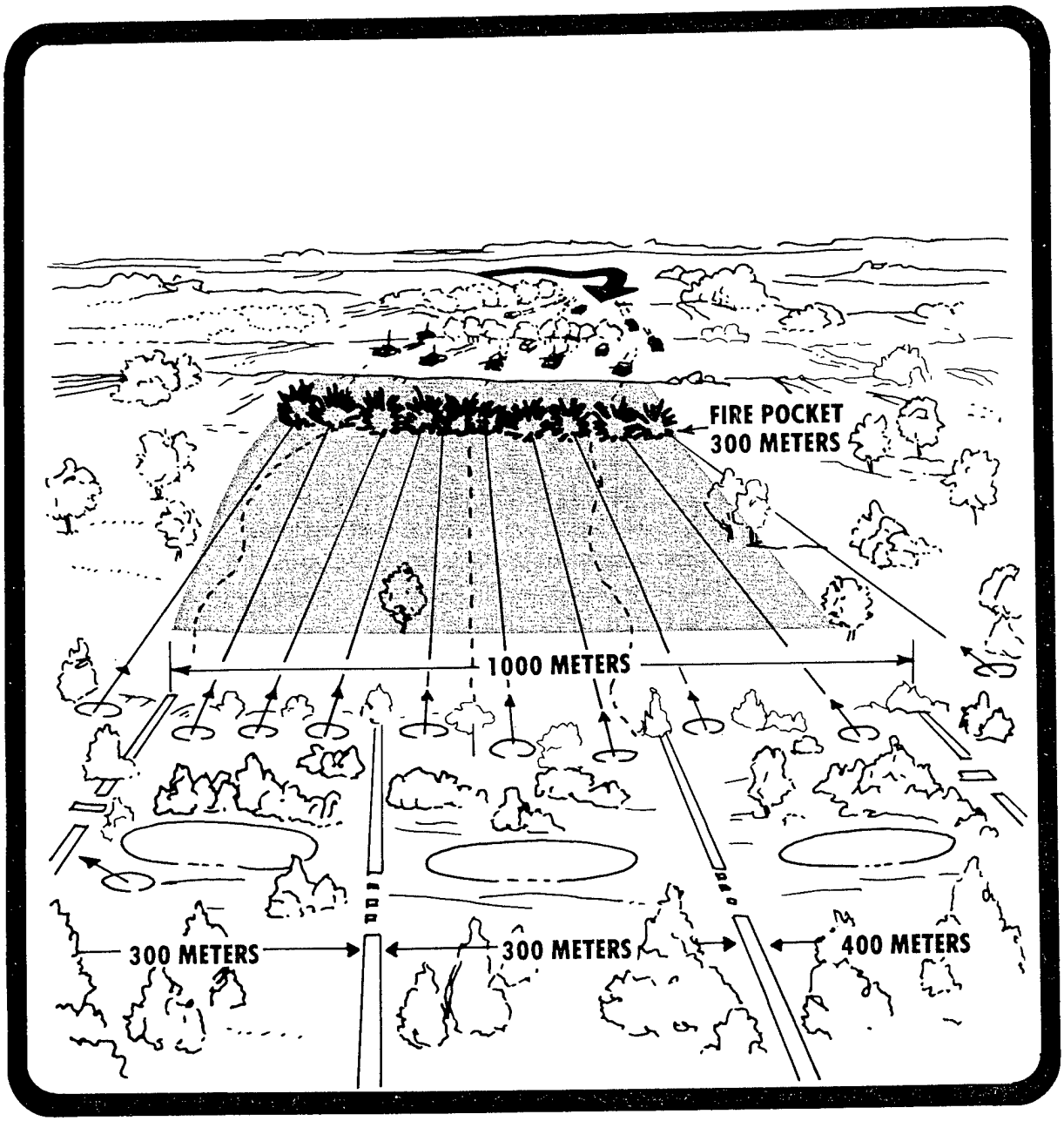
The RPG-7 will be used in the attack to:

- **Engage tanks and APCs at close range.**
- **Attack bunkers and fortifications.**

Defense

A motorized battalion conducting a hasty defense employs company strongpoints and will try to canalize enemy armor into a fire pocket. The RPG-7s of the platoons on the strong point would be employed as part of that fire pocket.

The RPG-7s will normally hold their fire until the attacking unit closes to about 300 meters from the defensive position.



The company strongpoint depicted is part of the battalion main defense. But if there were no covering force, the battalion commander would establish a reinforced platoon strongpoint about 1000 meters in front of his main defense. The platoon would be deployed and employed identically to a platoon of the main defense in order to deceive the attacker as to the true location of the main defense.

THE RPG-7 HAS THESE MAIN STRENGTHS:

- Easily employed in all types of terrain.
- Widely distributed.
- Difficult to detect.
- Can be used in built-up areas.
- Can penetrate bunkers and buildings.
- Difficult to evade after firing.
- Has an effective passive night sight.
- Optical sight can be used under illumination.
- Lethal at all ranges.

THE RPG-7 HAS THESE MAIN WEAKNESSES:

- Requires well trained gunners to aim in crosswinds.
- Hard to hit a moving target.
- Requires 14 seconds to reload and re-aim.
- Warhead can be defeated or degraded by standoff.
- Smoke is effective.
- Gunner is vulnerable to suppressive fires.

III
COUNTERMEASURES

U.S. combined arms tactics are the basis for effective countermeasures against the RPG-7. Tanks and mechanized infantry, supported by artillery, can defend or attack successfully against an enemy which has heavy concentrations of RPG-7s — if the captains, lieutenants, and sergeants understand what the weapon can and cannot do, and plan and train accordingly.

U.S. Defensive Countermeasures

- RPG-7 gunners must expose themselves to fire their weapons and to observe the strike of their rounds. Accordingly, they are vulnerable to any antipersonnel round. Indirect fire from artillery and mortars will suppress them, as will accurate automatic weapons and rifle fire.

- U.S. tanks and APCs on defensive positions should be located to minimize the area of exposed armor. Defilade should be sought, including protection from flanking and rear attack, as well as frontal fire.

- Positions in trees and underbrush are advantageous not only because of the concealment they offer, but also because they will act as an RPG screen. Where time and material are available, consideration should be given to erecting artificial RPG screens.

- Units moving within a defensive position — for example, from one blocking position to another — must anticipate RPG attack, and select their routes and provide suppressive fire accordingly.

- U.S. artillery commanders should site their pieces in firing positions which provide defilade, and minimize vulnerability to RPG attack. Battery defense plans should include provisions for antipersonnel fires against RPGs at night.

- All units should anticipate night attacks by RPG-7 gunners exploiting the effective passive night sights of the weapon. Provision should be made for prompt counterfire, to suppress second shots.

U.S. Offensive Countermeasures

- U.S. tank and mechanized forces moving to attack must anticipate fighting through a system of integrated antiarmor fires which can start as far as 3,000 meters from the enemy's defensive positions. Heavy RPG fire must be expected whenever the attackers close with an enemy unit, of whatever size.

- Attackers should seek routes of approach providing cover and concealment, since both significantly reduce the RPG-7s effectiveness. Careful use of terrain and continuous rapid movement make it difficult for RPG-7 gunners to deliver aimed fire. Trees and bushes can predetonate or disarm the round, and obscure the gunner's vision.

- Obscuration is an effective counter to the RPG: smoke delivered in front of known or suspected RPG positions will curtain effective fire. High winds, particularly crosswinds, may make the use of smoke difficult, but such winds also make it hard for the RPG unit to aim effectively.

- The RPG-7 gunner must expose himself to fire, and to observe the strike of his rounds. He is therefore vulnerable to suppressive fire. Preplanned suppression, especially for artillery and mortars, should anticipate RPG positions. But when the attacking force comes under RPG fire, the machineguns of the tanks and APCs are the quickest and most effective counter. Prompt suppression from attacking tanks or infantry can kill the gunner, or drive him to ground.

- When contact with RPGs is anticipated, tank platoon leaders should consider having one tank in each section carry a loaded APERS round for immediate RPG counterfire.

- RPG-7 gunners are particularly vulnerable to artillery rounds bursting overhead, so suppression should exploit VT and time fire.

- Enemy defensive doctrine teaches ambush of attacking armor from covered positions. U.S. Infantry accompanying our armor must be prepared to attack into such positions.

- Close combat with RPG-7s — within 300 meters — demands swift, effective use of cover, concealment, suppression, and teamwork: training of tank-infantry teams should emphasize reaction to RPG fire.

Combat in Built-up Areas

Fighting among buildings literally adds a third dimension: an RPG-7 can be fired from within buildings, and from atop roofs down onto attacking armor. This added dimension increases the responsibilities of US Infantry for protecting our armor by suppression and attack of RPG positions. Both on the attack and defense, the enemy can be expected to use numerous RPG, the most effective counter to which will be our machineguns, rifles, grenades, and LAWs.

Training

Publications which describe techniques for training the combined arms team to operate on the highly lethal modern battlefield are or will be soon available to the unit commander through normal distribution channels. Here is a list of publications which will provide training guidance.

Armor and Mech Infantry — Use of Terrain and Suppression

TC 7-1
TC 7-3
TC 7-4
TC 7-50
TC 17-15-3
TC 17-36-2
TC 71-4-2
TRADOC Bulletin 1
TRADOC Bulletin 1U
TRADOC Bulletin 2
TRADOC Bulletin 2U

Arty-Suppression/Obscuration

TC 6-20-1
TC 6-20-2

RPG-7 Training Aids

Each TASO has master copies of the diagrams and pictures in this Bulletin from which you can order 35mm slides or vugraphs for use in officer schools, or unit training.

Each TASO can also order a realistic mockup of the RPG-7 launcher and round which can be used for recognition training, and added realism in field training.

APPENDIX A
ORDERING TRADOC BULLETINS

Purpose. A series of TRADOC Bulletins are being published by HQ TRADOC to provide commanders timely technical information on weapons, tactics and training technique. It is not intended to supplant doctrinal publications, but to supplant material on "How to fight" with data derived from tests, recent intelligence, or other sources, which probe "why?"

Applicability. TRADOC Bulletins are developed by Headquarters, TRADOC using the most comprehensive and current military and civilian data available. Army Training and Evaluation Programs (ARTEP), Field Manuals (FM) and Training Circulars (TC) will continue to be the primary training references. TRADOC Bulletins will supplement them with an explanation of why we are training in a given manner. TRADOC Bulletins should enable commanders to better stimulate and motivate subordinates to understand why we train the way we do.

Index of Series. TRADOC Bulletins are cataloged in DA Pamphlet 310-3, "Index of Doctrinal, Training and Organizational Publications." The series are numbered consecutively and each TRADOC Bulletin is announced at time of printing in the information bulletin distributed to all pinpoint account holders by the US Army AG Publications Center.

Additional Copies. Submit DA Form 17 to order more copies of this TRADOC Bulletin.

Permanent Distribution. Pinpoint account holders receiving TRADOC Bulletin Number 1 from Baltimore will automatically receive two copies of all subsequent issues unless a DA Form 12-11B is submitted to change that quantity. Others desiring to be added to the permanent distribution list for TRADOC Bulletins must submit a DA Form 12-11B. Units which are required to submit publication requests through another headquarters should send the completed exerpt through proper authority.

Reference for Distribution Procedures. DA Pamphlet 310-10 explains the pinpoint distribution system and how to establish or update an existing account at the US Army AG Publications Center.

Enter pinpoint account number established with USA AG Pub Cen, Baltimore, MD.

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ARMA2CO & ACE 2

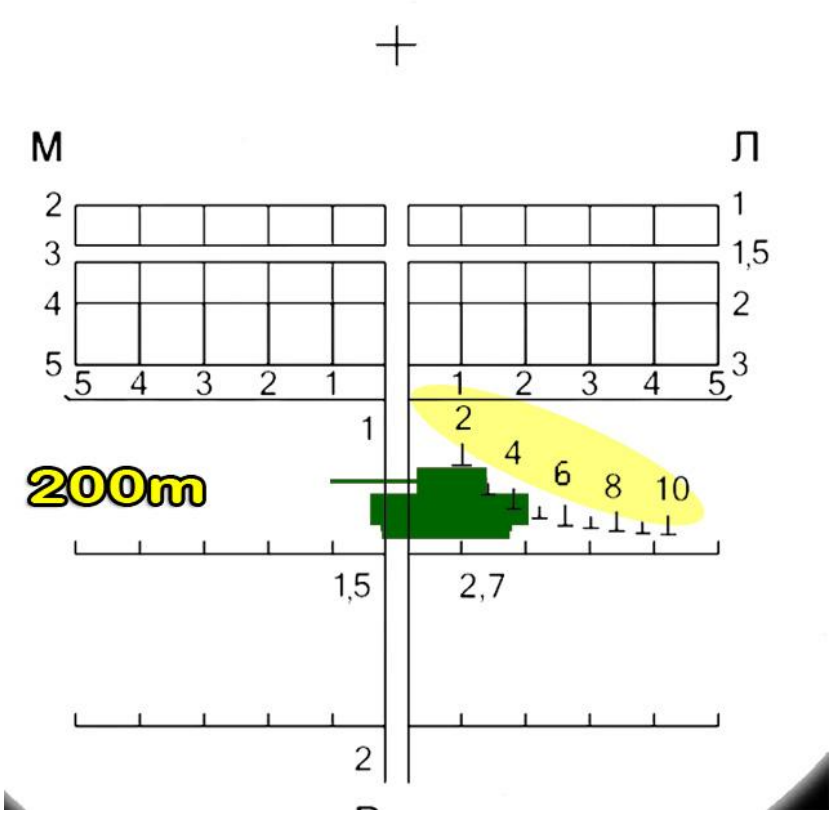
RPG-7 PGO-7

(manual ver 1.0)

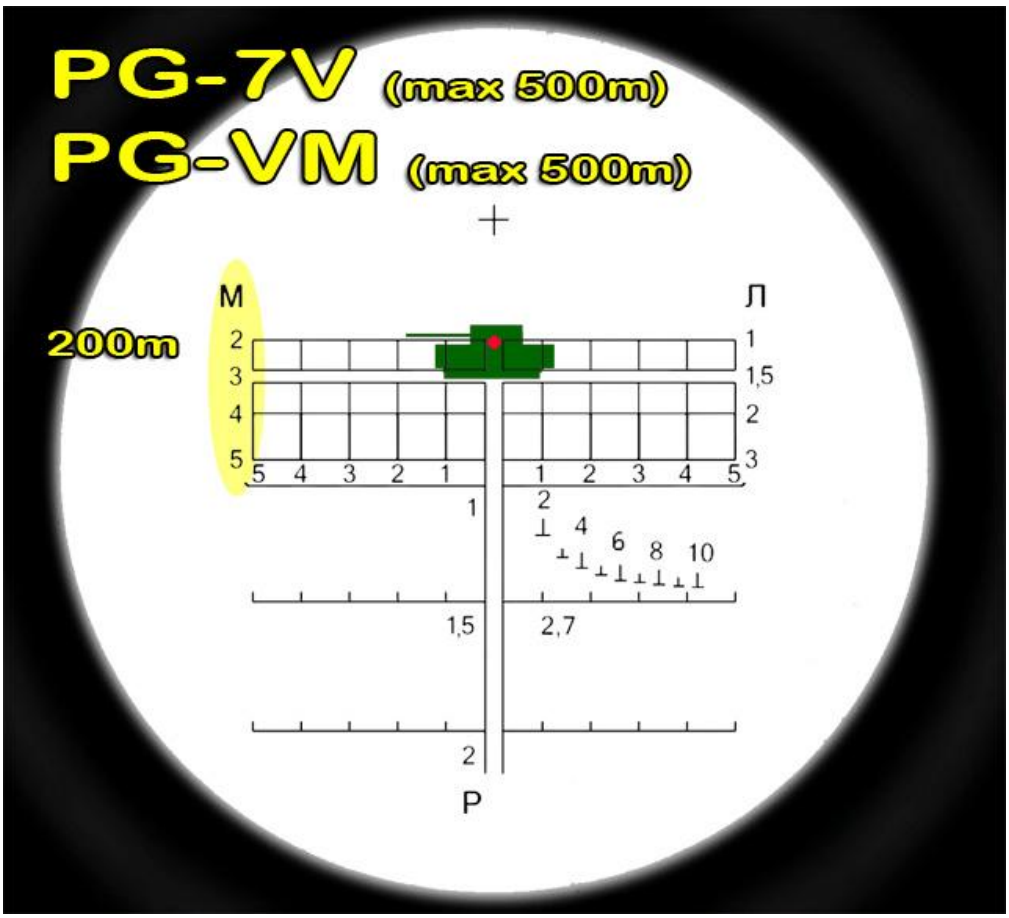
Step 1. Choose the right grenade.

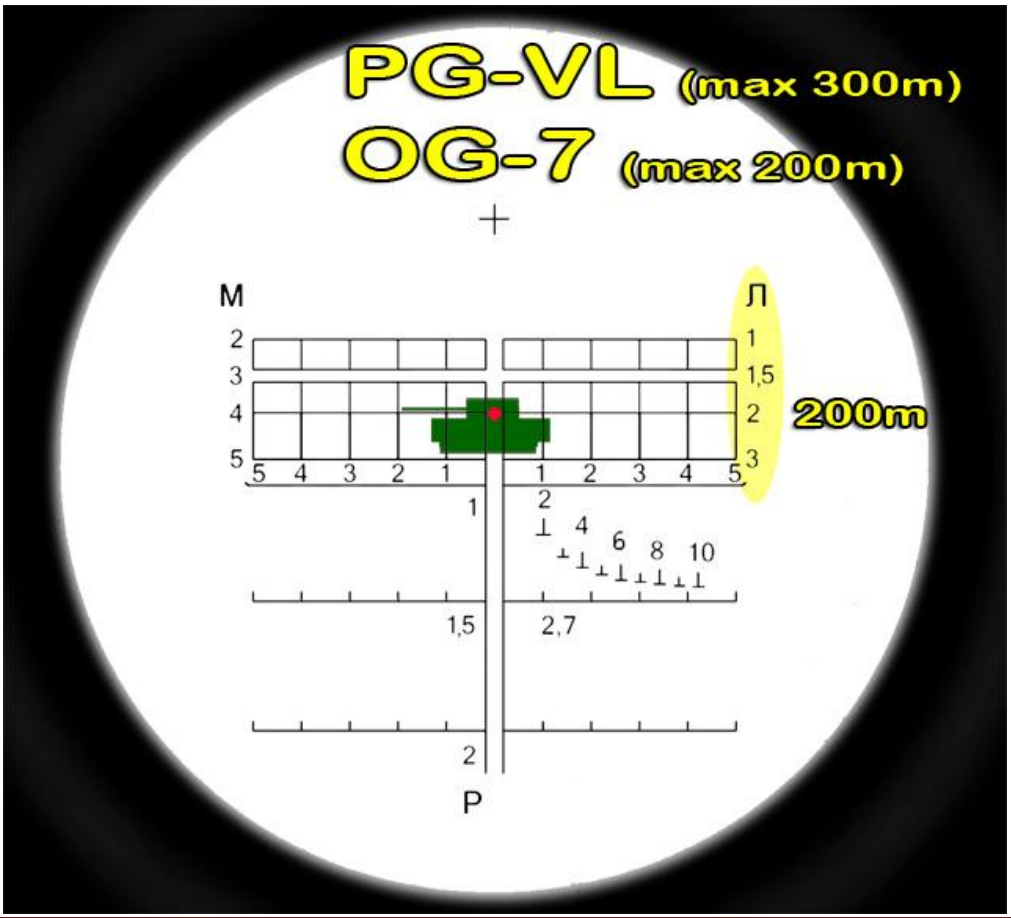
Grenade	Use against	Effective range 99% hit
PG-7V	**Light armour**	500m
PG-7VL	**Medium armour**	300m
PG-7VR Tandem	**Heavy armour**	200m
PG-7VM	**Tanks, self-propelled guns and other armoured vehicles. It can also be used against enemy troops in field shelters and in different fortifications.**	500m
TGB-7V	**Soft vehicle, personnel**	200m
OG-7	**Personnel**	200m

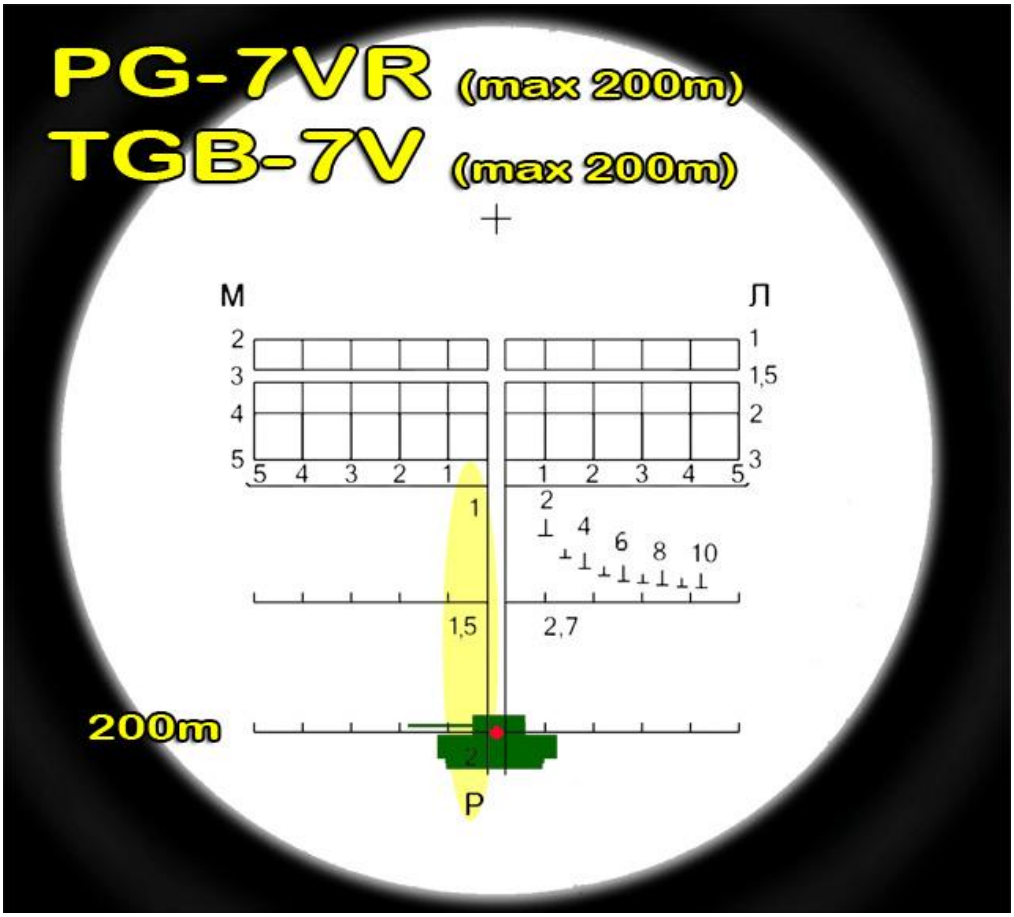
Step 2. Estimate the distance to the target



Step 3. Aim properly (grenade type)







Above examples are for the armour target in 200m distance.

ANTIARMOR WEAPONS

Subcourse Number IN0546

Edition B

UNITED STATES ARMY INFANTRY SCHOOL
FORT BENNING, GEORGIA 31905-5593

5 CREDIT HOURS

Edition Date: April 1996

SUBCOURSE OVERVIEW

This subcourse is designed to teach you to identify the characteristics of opposing forces antiarmor weapons, current opposing forces antitank guided missiles, U.S. antiarmor weapons, (including TOW 2 mounts and carriers and TOW missile types and markings), and future antiarmor weapons (both US and opposing forces).

There are no prerequisites for this subcourse.

This subcourse reflects the doctrine that was current at the time it was prepared. In your own work situation, always refer to the latest publications.

The words "he," "him," "his," and "men," when used in this publication, represent both the masculine and feminine genders unless otherwise stated.

TERMINAL LEARNING OBJECTIVE

Action: You will be able to identify the characteristics of opposing forces antiarmor weapons, current opposing forces antitank guided missiles, U.S. antiarmor weapons, (including TOW 2 mounts and carriers and TOW missile types and markings), and future antiarmor weapons (both US and opposing forces).

Condition: Given the subcourse material contained in this lesson.

Standard: To demonstrate competency of this subcourse, you must achieve a 70 percent or higher on the subcourse examination.

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Subcourse Overview

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Part A: Antiarmor Weapons

Part B: TOW/TOW 2 Mounts and Carriers

Part C: TOW/TOW 2 Missile Types and Markings

Practice Exercises

Lesson 2: Current Opposing Forces Antiarmor Weapons

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Part C: Antitank Guided Missiles

Part D: Soviet Tanks in Third World Nations

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Lesson 3: Future Antiarmor Weapons Strategy

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Part B: Future Opposing Forces Antiarmor Weapons Strategy

Practice Exercise

IN0546 Edition B Examination

Lesson 1

CURRENT U.S. ARMY ANTIARMOR WEAPONS

OVERVIEW

Lesson Description:

In this lesson, you will learn to identify the characteristics of the following current US Army antitank weapons: the Light Antitank Weapon (LAW); the Dragon Medium Antitank/Assault Weapon; and the Launcher Cartridge 84-MM, M136 (AT4), HEAT. In addition, you will learn to identify the characteristics of TOW/TOW 2 mounts and carriers and TOW/TOW 2 missile types and markings.

Terminal Learning Objective:

Action: Identify the characteristics and components of the following current U. S. Army antitank weapons: Light Antitank Weapon (LAW); Dragon Medium Antitank/Assault Weapon; and the

Launcher Cartridge 84-MM, M136 (AT4), HEAT. In addition, identify the characteristics of TOW/TOW 2 mounts and carriers and TOW/TOW 2 missile types and markings.

Condition: Given the subcourse material contained in this lesson.

Standard: Identify the characteristics of the Light Antitank Weapon (LAW); the Dragon Medium Antitank/Assault Weapon; and the Launcher Cartridge 84-MM, M136 (AT4), HEAT; and TOW/TOW 2 mounts and carriers and TOW/TOW 2 missile types and markings.

References: The material contained in this lesson was derived from the following publications:

FM 23-24
FM 23-25
FM 23-33
FM 23-34
FM 1-402

INTRODUCTION

The United States Army has a number of antiarmor weapons to use against the armored personnel carriers (wheeled and tracked) and tanks (as well as bunkers and other fortifications) of opposing forces. These antiarmor weapons include the light antitank weapon (LAW); the Dragon Medium Antitank/Assault Weapon; and the Launcher and Cartridge 84-MM, M136 (AT4), HEAT. In addition, the TOW Weapon System is used to engage enemy armor. This lesson will teach you to identify the characteristics of the LAW, the Dragon, and the AT4 as well as the characteristics of TOW/TOW 2 mounts and carriers and TOW/TOW 2 missile types and markings.

PART A - antiarmor WEAPONS

1. M72A2 Light Antitank Weapon (LAW).

The following paragraphs discuss the characteristics of the M72A2 Light Antitank Weapon (LAW).

a. Background. The LAW (shown in Figure 1-1) is a lightweight, self-contained antitank weapon consisting of a rocket packed in a launcher. The launcher serves as a watertight packing container for the rocket and houses a percussion-type firing mechanism to activate the rocket.

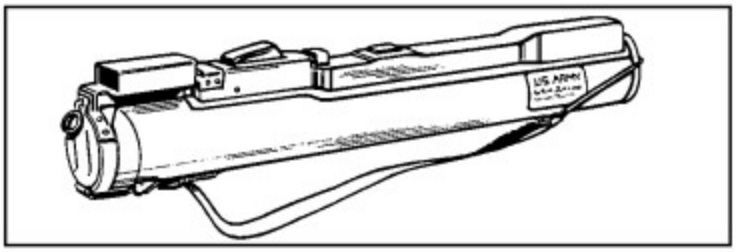

Figure 1-1. M72A2 LAW (Closed Position).

The launcher must be extended to the open position, as shown in Figure 1-2, for firing. The rocket is fixed inside the launcher and attached to it by the igniter.

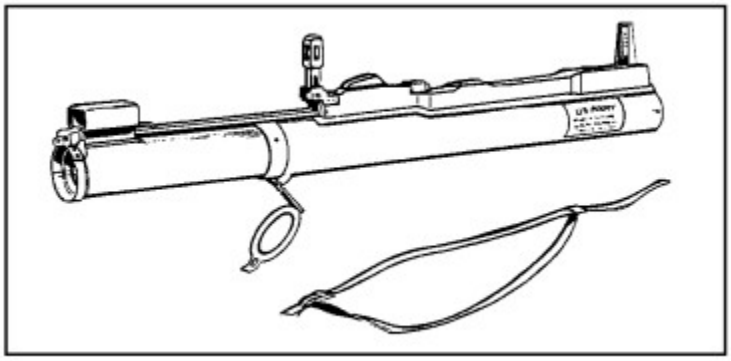

Figure 1-2. M72A2 LAW (Open Position).

The rocket (shown in Figure 1-3) is a percussion-ignited, fin-stabilized, fixed munition.

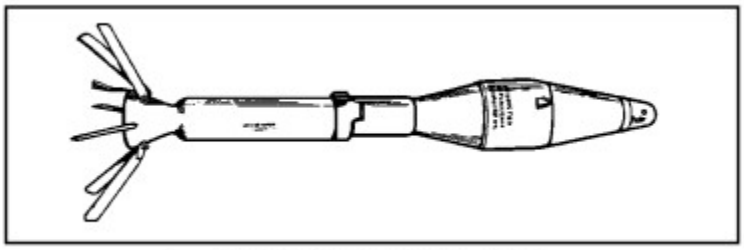

Figure 1-3. 66-MM High Explosive Antitank (Heat) Rocket.

The M72A2 rocket has a greater armor penetrating capability than the M72A1 rocket.

The LAW is used as ammunition rather than as an individual weapon. It is carried and employed by the soldier in addition to his basic weapon. Basic loads of LAW are assigned to units. Individuals assigned to units authorized a basic load of LAW should be trained in its use. LAW supplements other organic antitank weapons. It provides the primary means of antitank protection for the rifle squad and other units or installations which do not have organic antitank weapons. It may be used in the offense by assault elements or in the defense by any combat or other element of the Army.

b. Offensive Capabilities. In the attack, the LAW should be readily available to

influence the action where necessary. Due to its relatively short range, the LAW should be spread throughout the maneuver element. The LAW is employed primarily against the armored vehicle. It may also be used against:

- Light vehicles.
- Bunkers.
- Pillboxes.
- Other crew-served weapon positions..

The LAW's light weight and size make it the ideal weapon for armor-killer operations, ranger operations, and special forces missions.

The night vision sight (AN/PVS-4) (when available) can be attached to the LAW for operation during periods of reduced visibility or darkness.

c. Defensive Capabilities. LAWs should be positioned laterally and in depth to cover the most likely avenues of armored approach. Lateral dispersion is necessary to increase the probability of obtaining oblique fire on enemy armor approaching the defensive position. Due to its one-shot capability, more than one LAW should normally be assigned to troops designated to fire it. Since all riflemen may be given a LAW, consideration must be given to the backblast when siting and constructing fighting positions.

The LAW can be effectively employed at night by using artificial illumination. The 40-mm illumination round is good for LAW engagements. Illumination should be placed above and slightly beyond the target. Night firing is an essential part of LAW marksmanship training.

2. Launcher and Cartridge 84-MM, M136 (AT4), HEAT.

This paragraph discusses the characteristics of the launcher and cartridge, 84-mm, M136 (AT4), HEAT, or AT4.

a. Characteristics. The AT4 is a lightweight, self-contained antiarmor weapon. It consists of a free-flight, fin-stabilized cartridge packed in an expendable launcher. It is man-portable and fired from the right shoulder only. It is issued as a round of ammunition and requires minimal operator maintenance. The launcher (shown in Figure 1-4) serves as a watertight packing container for transportation and storage.

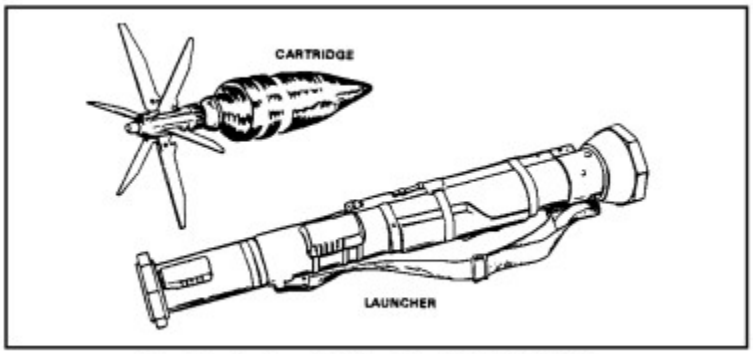

Figure 1-4. Launcher and Cartridge, 84-mm, M136 (AT4), HEAT.

b. Use. In addition to your weapon, you carry and use the AT4. It supplements other organic antiarmor weapons. It provides antiarmor capability for the rifle squad and other units or installations that do not have organic antiarmor weapons. The AT4 can be used in offenses by assault and support elements or in defenses by any element of the US Army.

c. Training Program. The recommended training program should be used by units to maintain the soldier's proficiency with the AT4.

d. Employment. The AT4 is mainly used against armored personnel carriers (APCs). However, it can be used against battle tanks when it is fired at the flanks or the rear. It can also be used as an assault weapon against bunkers, field fortifications, and other hard-point positions.

e. Environments. The AT4 is designed to withstand arctic, tropic, and desert conditions. It can withstand any combination of natural environments.

f. Visibility. The AT4 can be used during limited visibility. Target engagement, however, is limited by your ability, as the firer, to visually detect and identify the target and determine the range to the target.

g. Technical Data and Nomenclature. The following paragraphs list technical data concerning the AT4 system.

(1) Technical Data. These are the technical data regarding the AT4:

- Weight = 6.7 kilograms (14.8 pounds) (overall system); 1.8 kilograms (4 pounds) (cartridge)
- Caliber = 84 millimeters
- Length = 1,020 millimeters (40 inches)
- Muzzle velocity = 290 miles per hour (mph) (950 feet per second (fps))
- Operating Temperature Range = -40 degrees C to 60 degrees C (40 degrees F to 140 degrees F)
- Range = 2,100 meters (6,890 feet) (maximum)
    - Maximum effective range = 300 meters (985 feet)
    - Minimum arming range = 10 meters (33 feet)
    - Minimum target engagement range (training) = 30 meters (99 feet)

(2) Nomenclature. The nomenclature for the common names of the AT4 components are:

Common Name	Nomenclature
Tracer trainer	M287 9-mm tracer bullet training device

Forward safety	Safety lever
Trainer body assembly	Barrel assembly
Face and shoulder pad	Recoil pad
Front and rear sight covers	Protective housings
Lanyard	Chain assembly
Cartridge	M939 9-mm tracer cartridge

h. Ammunition. The AT4 is issued as a round of ammunition. The cartridge consists of the following parts:

Fin assembly with a tracer element.

Point-initiating, base-detonating, piezo-electric fuze.

Warhead body with liner.

Precision-shaped explosive charge (it is the only tactical ammunition for the AT4). The HEAT cartridge is shown in Figure 1-5..

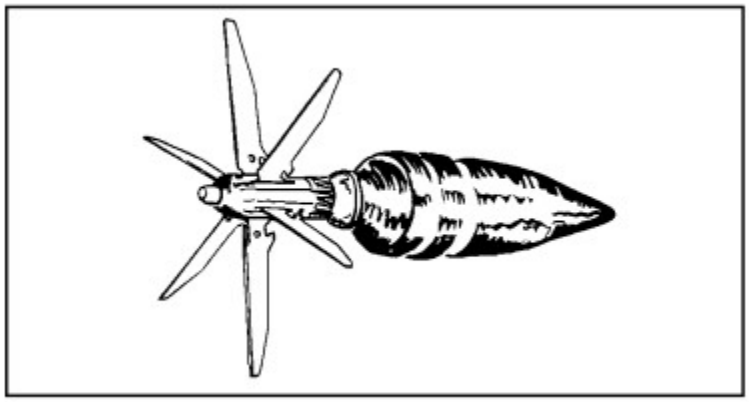

Figure 1-5. HEAT Cartridge

The AT4 is used mainly as an antiarmor weapon. However, it can be used against gun emplacements and bunkers.

i. Technical Data. The following technical data pertain to the tactical cartridge:

- Length = 460 millimeters (18 inches).
- Caliber = 84 millimeters.
- Warhead = HEAT (precision-shaped charge).
- Fuze = piezoelectric crystal.

j. Packaging. Five AT4s are packed in a wood container. Each AT4 is further protected by a plastic barrier bag. A pallet load must not be stacked higher than four containers per pallet because of weight stress on the containers.

Each wood container is checked for serial numbers for the individual launchers and classification (shown in Figure 1-6). The container is checked for damage. If it is damaged or punctured, the proper authority is notified.

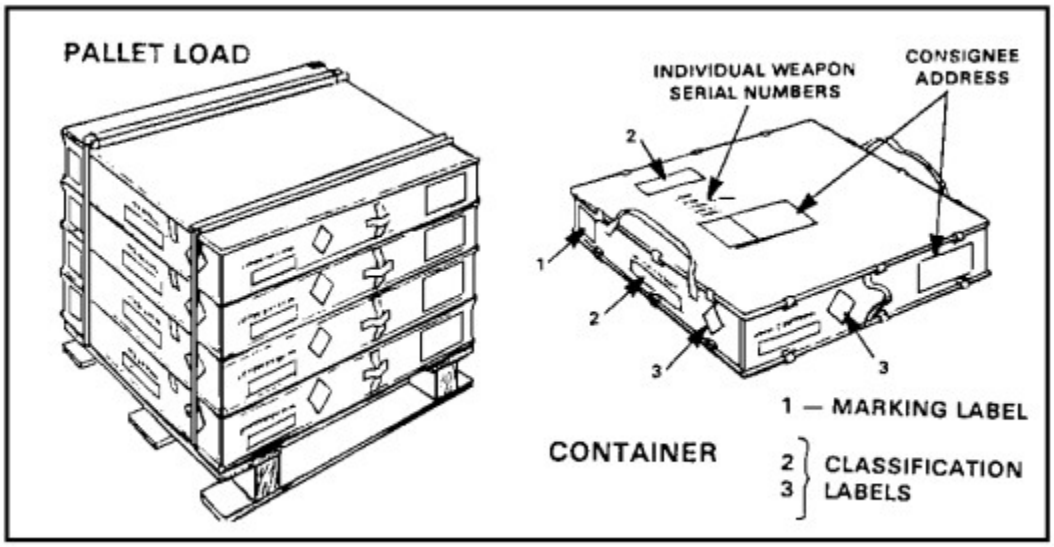

Figure 1-6. Ammunition Packaging.

k. Launcher Color-Code Band. The launcher color-code band is between the front and the rear sights (shown in Figure 1-7).

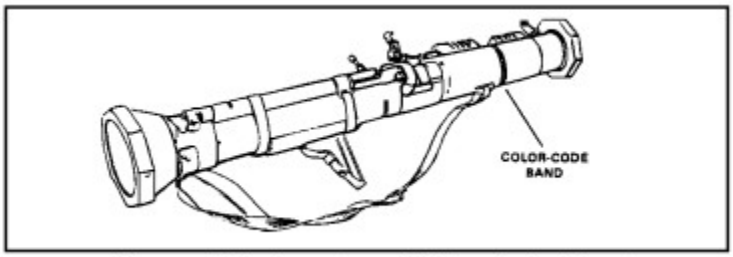

Figure 1-7. Location of Color-Code Band.

The color codes are:

- Black--with yellow band = high-explosive, antiarmor.
- Gold--field handling trainer.

NOTE: The M287 9-mm tracer bullet training device (TBT) has no color-code band.

l. Service Upon Receipt. Upon receipt of the wood container, open the container. Remove the plastic barrier bag from each of the five AT4s. Perform serviceability checks.

m. Weapon Capabilities. The AT4 has greater penetrating power and after-armor effect than previous light antiarmor weapons. The use of the AT4 is not limited to armored vehicles. It is effective against bunkers and field fortifications.

n. Target Vulnerability. An armored vehicle usually has its heaviest armor on the front slopes. By comparison, the top, rear, flanks, and bottom have much less armor protection. The weak points of armor for the T62, the Soviet fighting vehicle (BMP), and the BRDM are shown in Figure 1-8. Firers should try to engage an armored vehicle from the flank or the rear. The flank offers the largest possible target area for target engagement. Firers should always try to get a center-of-mass hit.

Armored vehicles can be disabled in three ways:

- Mobility Kill. The vehicle has stopped moving because a track or a road wheel has been blown off or the vehicle has been hit in the engine compartment. The vehicle is no longer mobile, but it can still return fire.
- Firepower Kill. The main gun cannot return fire because it has been hit in the turret and its capability of firing has been knocked out. The vehicle can still move and is able, therefore, to get away.
- Catastrophic Kill. The vehicle is destroyed. To obtain a catastrophic kill, firers should be prepared to fire a second or a third shot to destroy the vehicle..

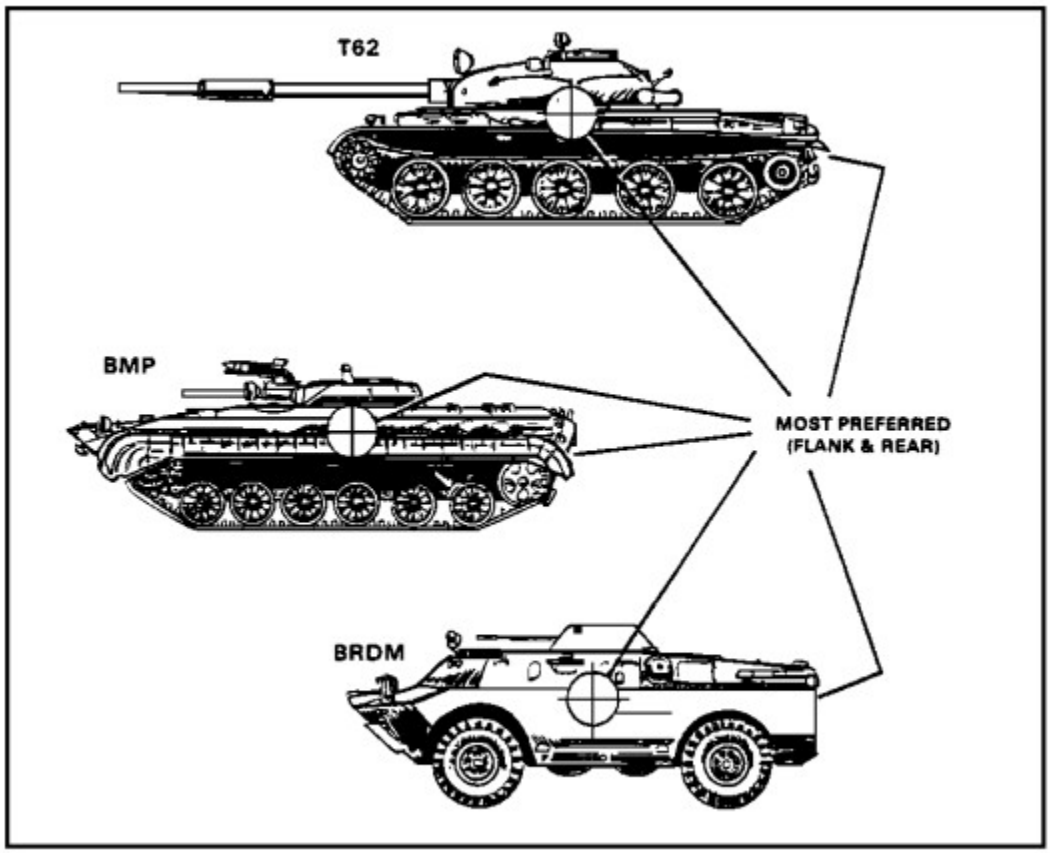

Figure 1-8. Armor Weak Points.

An armored vehicle without the protection of dismounted infantry is vulnerable to a close attack by well-armed infantry units. When an armored vehicle is buttoned up, the crew's visibility is restricted, as shown in Figure 1-9. This provides an opportunity for an armor-killer team to approach the vehicle with less risk of detection.

Natural or man-made obstacles force the vehicle to slow, stop, or bypass, thus enabling the firer to possibly achieve a first-round hit.

NOTE: Hitting an armored vehicle below center mass may stop the vehicle but not its turret or guns. The same is true of a rear shot. Firers should be ready to fire a second or a third shot to destroy the vehicle.

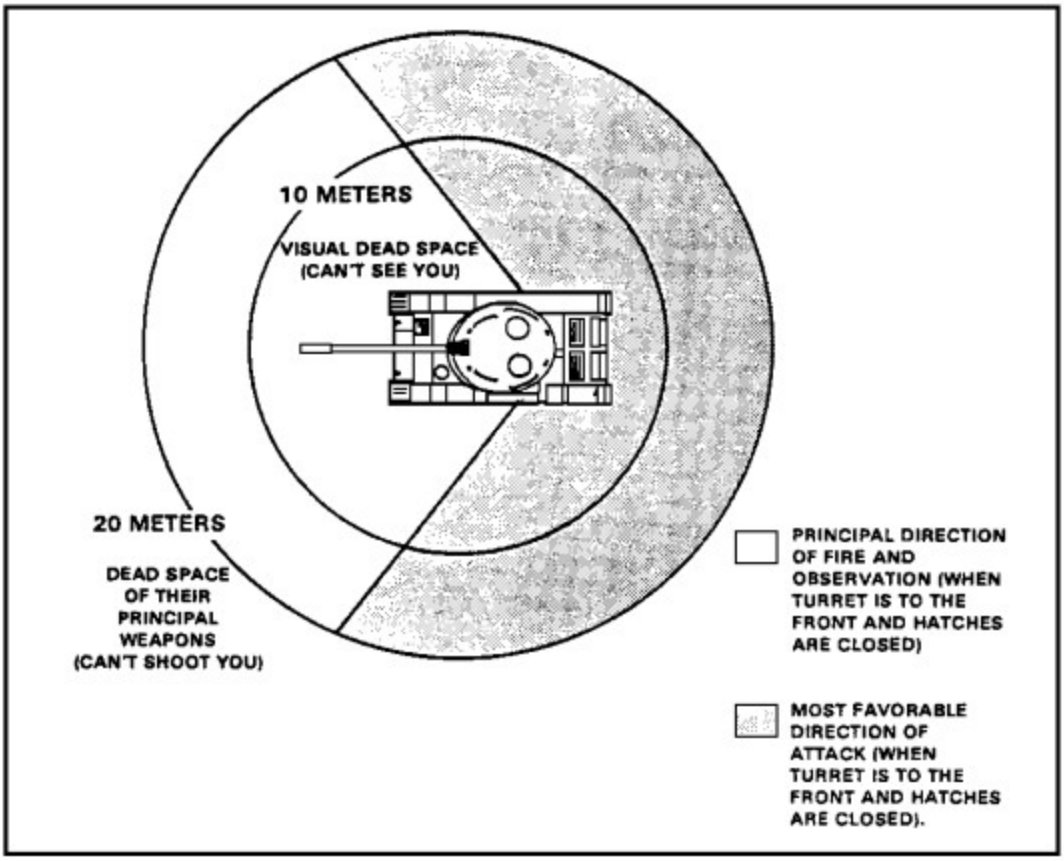
10 METERS
VISUAL DEAD SPACE (CAN'T SEE YOU)
20 METERS
DEAD SPACE OF THEIR PRINCIPAL WEAPONS (CAN'T SHOOT YOU)
PRINCIPAL DIRECTION OF FIRE AND OBSERVATION (WHEN TURRET IS TO THE FRONT AND HATCHES ARE CLOSED)
MOST FAVORABLE DIRECTION OF ATTACK (WHEN TURRET IS TO THE FRONT AND HATCHES ARE CLOSED).

Figure 1-9. Limited Visibility of Armored Vehicles.

3. Dragon Medium Antitank/Assault Weapon.

This paragraph discusses the characteristics and components of the M47 Dragon.

a. Characteristics. The guided missile system, surface attack: M47 (Dragon), is a man-portable, shoulder-fired, medium antitank weapon referred to as the Dragon. Capable of defeating armored vehicles, fortified bunkers, concrete gun emplacements, and other hardened targets on the battlefield, it can be operated by the individual soldier or by a two-man team. When you use the Dragon with the

mechanized infantry, you can mount and fire it from the armored personnel carrier (APC) or you can mount and fire it from the M3 or the M122 machine gun tripod, using the M175 mount. You can fire the Dragon using either the day tracker or the night tracker. The Dragon night tracker (AN/TAS-5) increases the gunner's ability to engage targets during limited visibility. You can engage targets during daylight and during limited visibility, such as that caused by smoke, fog, or darkness.

b. Components. The Dragon consists of the components shown in Figure 1-10. These components are as follows:

- Day tracker.
- Night tracker.
- Round of ammunition.

The round is the expendable part of the system. The round has two major assemblies:

- Launcher.
- Missile.

The launcher serves as the handling and carrying container for firing the missile.

The tracker is the reusable part of the system. It is designed for fast, easy detachment from the round. The tracker (day or night) determines any deviation of the missile from the line of sight (LOS) and generates correcting signals. These correcting signals are sent to the missile control system by a wire link.

c. Defensive Capabilities. The Dragon is basically a defensive weapon that can be used in all weather conditions and in any type of terrain. It is organic to infantry, armor, and artillery units. The Dragon provides the mounted or the dismounted soldier with a defense against hostile armor during both day and night operations.

The Dragon can be used during the assault against field fortifications, heavy weapon emplacements, and other hard-point targets. With its light weight, rapid deployment, and ease of operation, it is particularly suited for airborne and air mobile operations.

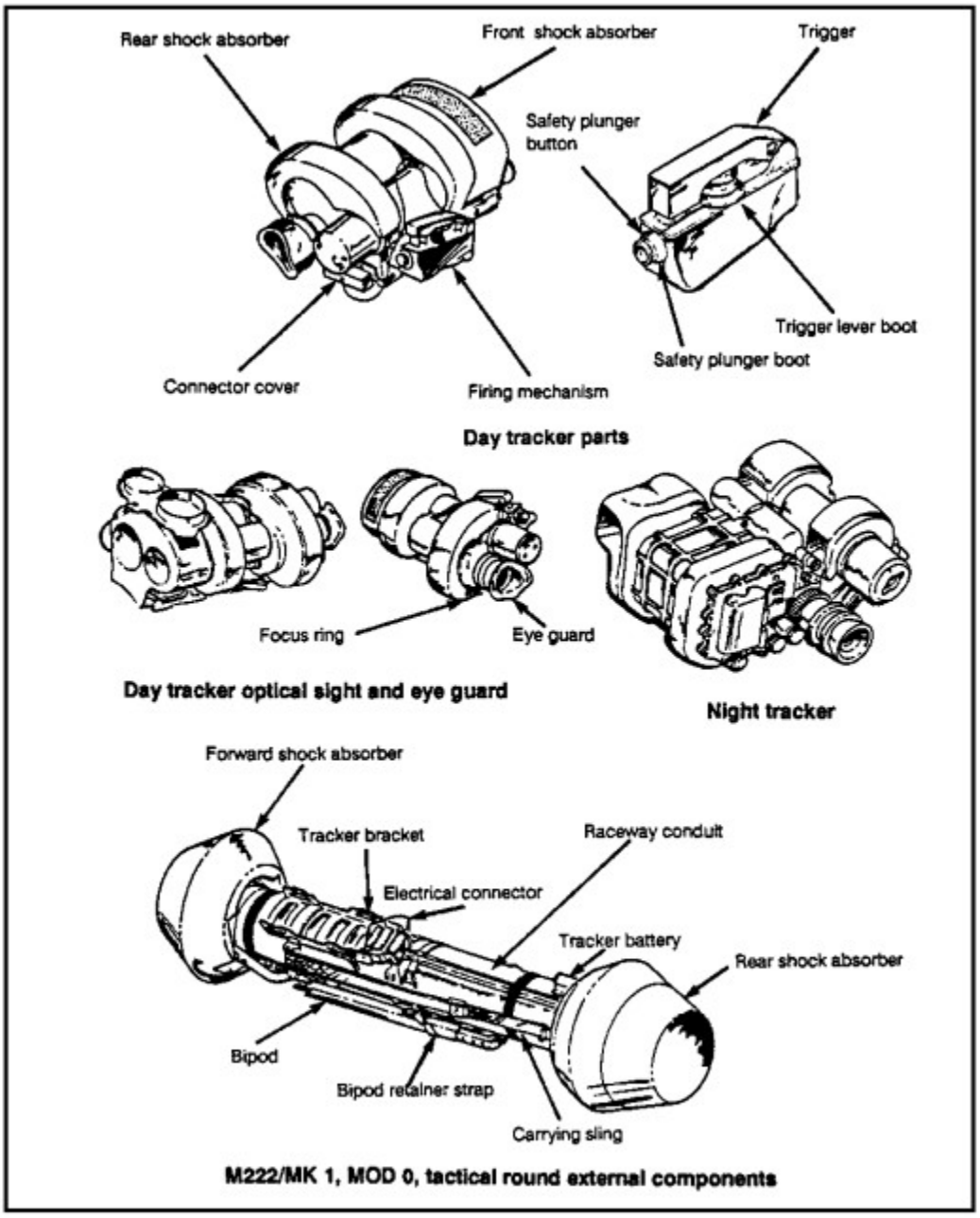

Figure 1-10. Dragon Components.

d. Tracking and Controlling Capabilities. The command line of sight guidance system of the Dragon provides a high probability of a hit. However, to achieve a hit, the gunner must be well trained concerning steady hold factors. The gunner acquires the target in the tracker (day or night) and sets and holds the sight cross hairs on the center mass on the exposed portion of the target. This provides a continuous line of sight for the tracker; other gunner control is required. The guidance and control are automatic until the missile impacts and the gunner

detaches the tracker, disposes of the expended launcher, and prepares to fire another round.

e. Mobility. The system can be hand-carried by one man. Therefore, the gunner/team chief can quickly displace to reduce the chance of detection or to engage targets that are not within the range of the primary fighting position.

f. Rounds. Three basic rounds are available for use with the Dragon: M222 and MK 1, MOD 0, tactical rounds (heat warheads), and M223 practice round (inert warhead).

All rounds use the same basic airframe, aerodynamic control system, command-link wire, and missile electronics design.

g. Equipment Data. The following data describe the general and the specific characteristics of the Dragon:

(1) General. The Dragon has the following general characteristics:

- Minimum range = 65 meters.
- Maximum range = 1,000 meters.
- Ammunition = high explosive antitank warhead and inert warhead.

(2) Specific. The Dragon has the following specific characteristics:

(a) Round: M222/M223 weight = 14.6 kilograms (25.29 pounds).

- Missile length = 744 millimeters (29.39 inches).
- Launcher length = 1,154 millimeters (44.1 inches).

(b) Round: MK1, MOD 0 weight = 16.2 kilograms (27.2 pounds).

- Missile length = 846 millimeters (33.32 inches)
- Launcher length = 1,154 millimeters (44.1 inches)

(c) Day tracker weight = 3.1 kilograms (6.7 pounds); length = 196 millimeters (7.72 inches)

(d) Night tracker weight = 9.82 kilograms (21.65 pounds); length = 368 millimeters (14.5 inches)

h. Night Tracker Coolant Cartridge and Battery Carrying Container. Mechanized infantry squad are issued five coolant cartridge packs and one battery carrying container full of components. A nonmechanized squad is issued five coolant cartridge packs and three battery carrying containers full of components.

i. Support Equipment (M113-Equipped Units Only). Units equipped with the M113 APC are authorized the following Dragon support equipment:

Guided missile launcher mount.

M175, M3/M122 machine gun tripods.

Vehicle storage kit.

(1) M175 Mounting Assembly. The guided missile launcher mount (shown in Figure 1-11) provides a stable platform for firing the Dragon missile from the M113 APC and the M3 or M122 machine gun tripods. The unit track mechanic installs the M175 mounting assembly on the APC. If the APC is turned in for overhaul or repair, ensure that the unit mechanic removes all support equipment.

The mounting assembly provides improved, stable firing and tracking conditions for the gunner, thereby increasing weapon system effectiveness.

The mount fires the M222/MK1, MOD 0, tactical rounds or the M233 practice round and accommodates the M54 launcher effect trainer (LET) and the M57 field handling trainer (FHT).

The round and the tracker are electrically mated through two connectors on the mount. Fire them using a remote firing mechanism on the right rear of the cradle.

Azimuth and elevation to reduce gunner and vehicle vibrations and assist the gunner in obtaining a firm, steady tracking action.

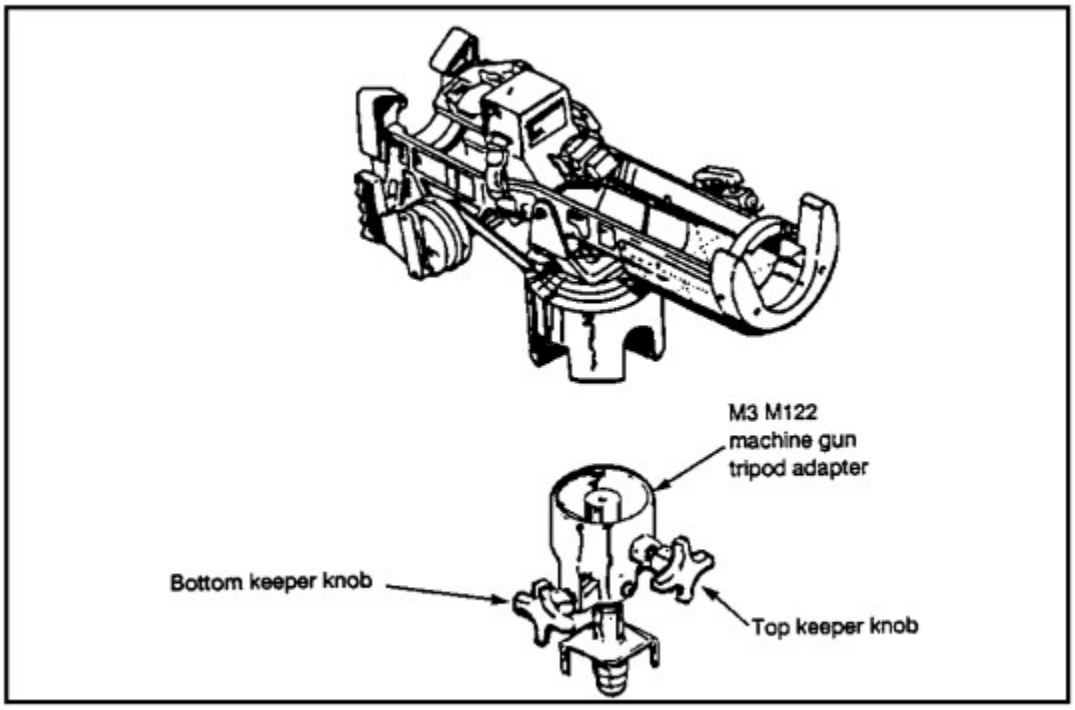

Figure 1-11. Guided Missile Launcher Mount.

(2) M3/M122 Machine Gun Tripod. Either the M3 or the M122 machine gun tripods (shown in Figure 1-12) can be used to fire the Dragon from a ground support position.

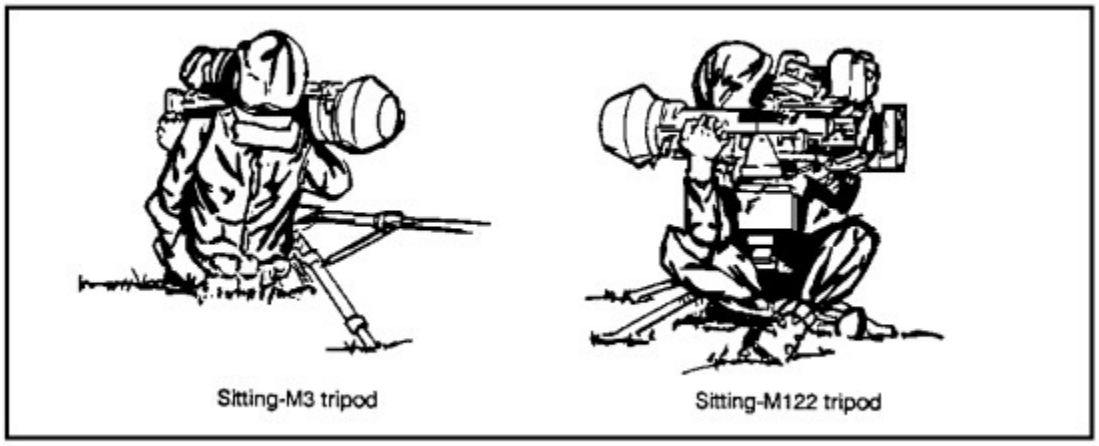

Figure 1-12. M3/M122 Machine Gun Tripods.

(3) Vehicle Storage Kit. The vehicle storage kit (shown in Figure 1-13) is installed in all M113 APCs assigned to mechanized infantry squads. It consists of the following night tracker support equipment:

- A night tracker storage rack, located just below the day tracker storage case, to secure the night tracker when it is not in use.
- A vehicle power conditioner to step down the power of the 24-volt battery.
- A battery charger rack and a PP-7382/TAS battery charger are also operated from the APC power source.
- Three coolant cartridge container storage racks and one battery container storage rack are under the personnel seats.

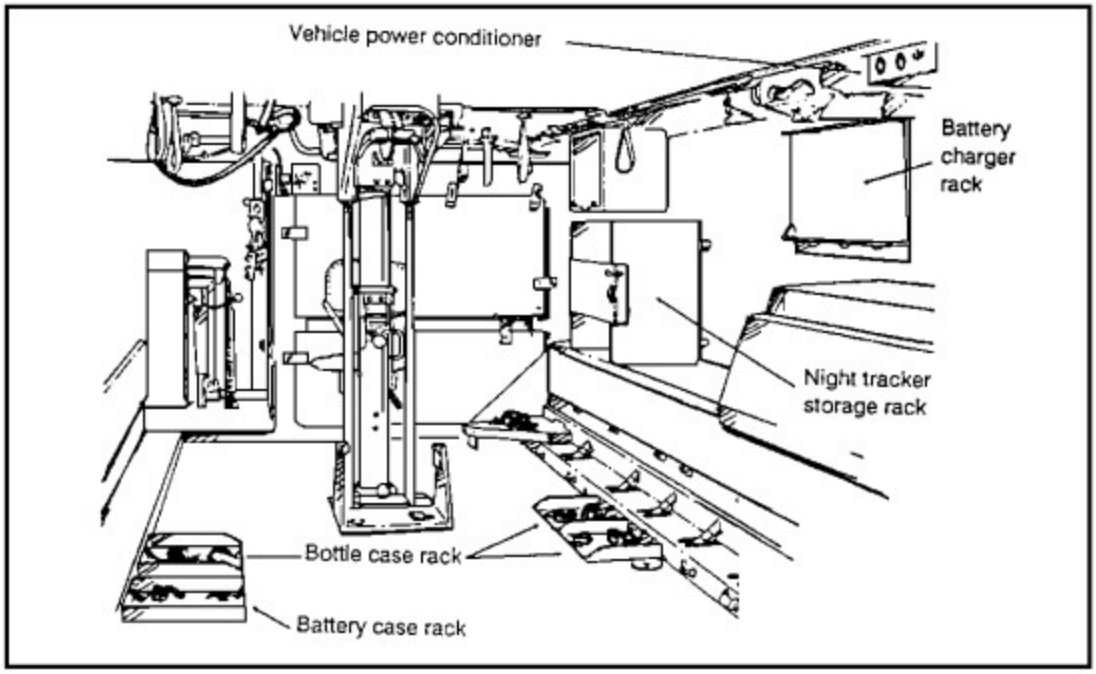

Figure 1-13. Vehicle Storage Kit.

PART B - TOW/TOW 2 MOUNTS AND CARRIERS

1. Introduction.

The tube-launched, optically tracked, wire-guided (TOW) weapon system has undergone several developments which have introduced significant improvements to the original (Basic) TOW, such as the Improved TOW (I-TOW) and the TOW 2 series (TOW 2, TOW 2A, and TOW 2B). The TOW/TOW 2 weapon system can be mounted on a tripod or carried on a number of carriers (M151A2, HMMWV, M113A2, M901A1, Cobra and Apache attack helicopters). Part B will teach you the characteristics of TOW mounts and carriers as well as the characteristics of TOW missiles and markings.

The tube-launched, optically tracked, wire-guided (TOW) is a crew-portable, heavy antitank missile weapon system. The TOW operates from

- the ground.
- armored, lightly armored, or unarmored multipurpose vehicles.
- helicopters.

The system consists of a guided missile and a launcher used to engage

- tanks.
- fortifications.
- other material targets.

The launcher is the hardware that initiates, tracks, and controls the flight of the missile.

This is done by guidance signals transmitted over a command-link wire that connects the missile with the launcher.

2. Characteristics.

The TOW weapon system has the characteristics identified in the following paragraphs.

a. Description. The TOW weapon system consists of a launcher which has tracking and control capabilities and the TOW, which is encased in a launch container. A night sight is also provided to aid in tracking during limited visibility. The launcher is equipped with self-contained, replaceable units.

b. Capabilities. The TOW weapon system can be employed in all weather conditions if the gunner can see his target through the optical sight or the night sight. The TOW is primarily an antitank weapon used to provide long-range engagement of all known armored targets. The TOW missile is capable of destroying targets at a maximum range of 3,750 meters (depending upon the type of missile).

The TOW also provides a long-range assault capability against

- heavily fortified bunkers.
- pill boxes.
- gun emplacements.

Components of the night sight are:

- AN/TAS-4 night sight.
- Boresight collimator.
- Night sight vehicle power conditioner.
- Batteries.
- Coolant cartridges.

The TOW missile is also a major component of the weapon system.

The TOW launcher has the following capabilities and features:

- It operates in all weather conditions in which the gunner can see the target through the optical sight or the night sight.
- It operates during the day and the night.
- It operates in temperatures of -32° to +60° C (-25° to +140° F).
- It operates at altitudes up to 3,050 meters (10,000 feet).
- It has a high first-round-hit chance against targets that stay still or move.
- The entire weapon system can be hand-carried by the weapons crew.
- It is easy to operate.
- Firing sites can be changed quickly to avoid being seen or to engage

targets not within the range of a single firing position.

- Mounting kits allow mounting on several different vehicles.
- It is easily removed or installed without the use of tools.
- The weapon system can be checked out by a self-test without the use of test equipment.
- Failed components can be replaced at the operating site by Direct Support personnel.
- The minimum and the maximum effective ranges of the missile are 65 to 3,750 meters. (Hit probability of extended range missile is reduced to 3,750 meters due to MGS circuitry design).

c. Tracking and/or Control Capabilities. The automatic missile tracking and/or control capabilities of the TOW weapon system provide a first-round-hit probability. To operate the system, the gunner performs the following actions:

- Places the cross hairs of the optical sighting system (either the optical sight or the night sight) on the target.
- Fires the missile.
- Keeps the cross hairs centered upon the image of his target until missile impact.

The optical tracking and command functions within the system guide the missile along the gunner's line of sight. The gunner does not apply lead, windage, or elevation.

d. Mobility. The TOW weapon system allows it to be mounted on a vehicle or to be emplaced on the ground (tripod-mounted) for operation. Missiles can be launched from either operational mode. The TOW weapon system appears in the following configurations:

- Tripod-Mounted TOW/TOW 2.
- M151A2-Mounted TOW/TOW 2.
- M966-Mounted TOW/TOW 2.
- M113A2-Mounted TOW (basic).
- M901-Series Improved TOW Vehicle.

A weapon crew can hand-carry the entire system. Therefore, emplacement sites can be changed quickly to minimize detection or to engage targets that are not within the range of one emplacement. The vehicle-mounted launcher has a greater degree of mobility and can be quickly prepared for use. The assembly and the disassembly of the launcher is accomplished quickly in the field without the use of tools. The operational condition of the assembled launcher can be checked any time by the use of built-in self-test circuits.

3. System Configurations.

The TOW weapon system comes in two configurations: the M220A1 (TOW) and the M220A2 (TOW 2).

a. M220A1 (TOW) Weapon System. The M220A1 TOW consists of the following major components (shown in Figures 1-14 and 1-15):

- Tripod.
- Traversing unit.
- Launch tube.
- Daysight tracker.
- AN/TAS-4 nightsight.
- Missile guidance set (MGS).
- A battery assembly housed in the compartment of the MGS.
- An encased missile.

The M220A1 weighs about 265.5 pounds with all its components and carrying cases. With the encased missile (BGM-71A), the M220A1 weighs 320 pounds.

The M220A1 TOW uses the following missiles:

- BGM-71A.
- BGM-71A-1.
- BGM-71A-2.
- BGM-71A-3.

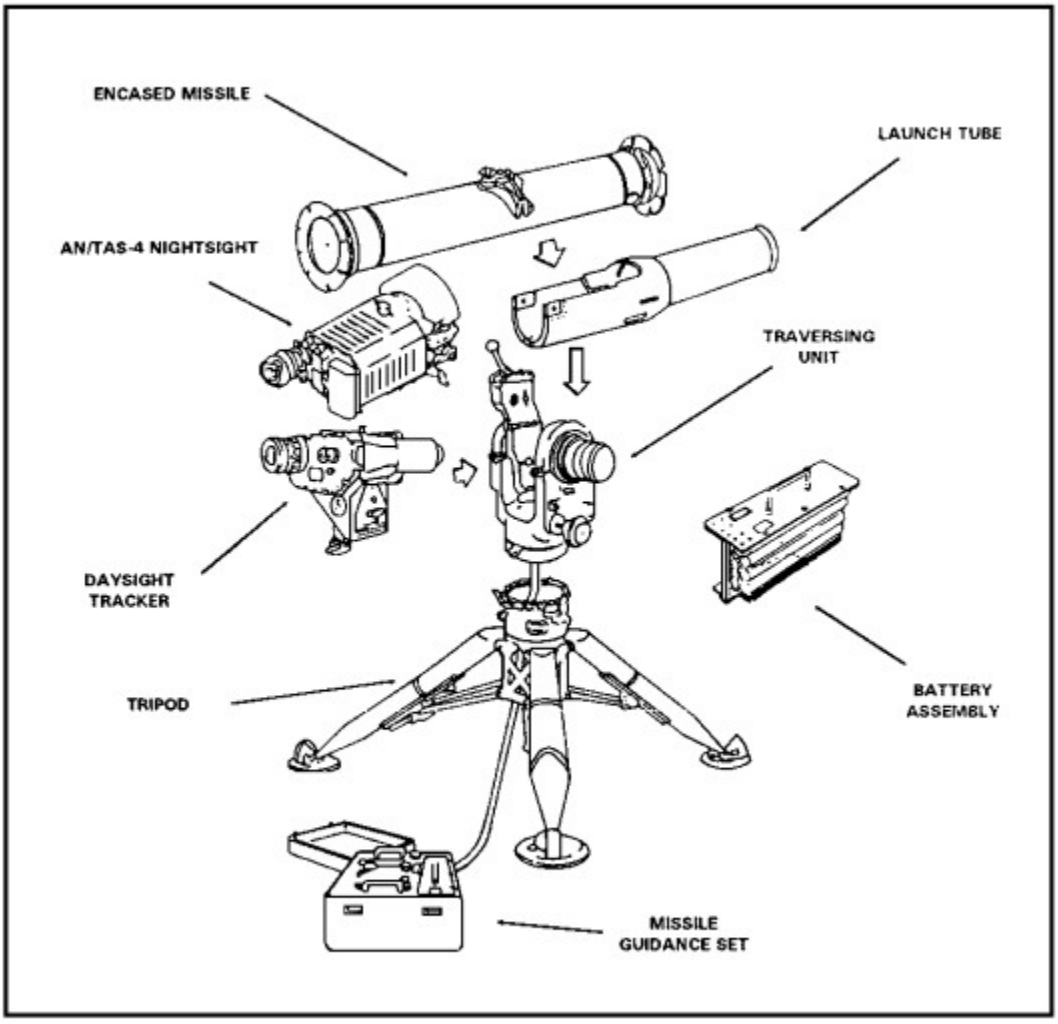

Figure 1-14. M220A1 TOW Components.

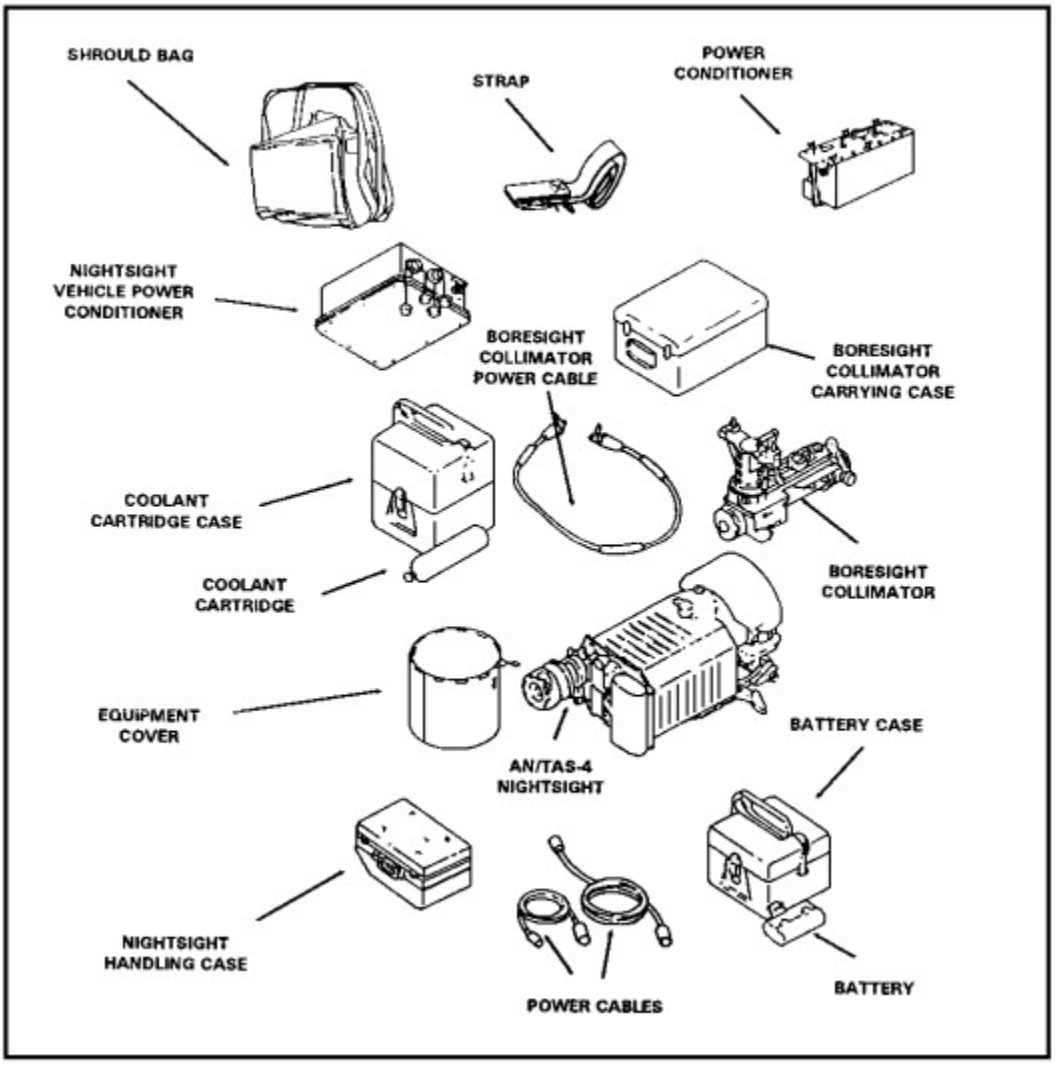

Figure 1-15. M220A1 TOW Components. (Continued).

It can also launch the BGM-71D (TOW 2) missile but lacks the capability to track the BGM-71D (TOW 2) through obscurants and countermeasures.

b. M220A2 TOW 2 Weapon System. The M220A2 is a combination of both a modification to the M220A1 TOW launcher and the addition of a new missile. The M220A2 TOW 2 launcher modified the M220A1 TOW components below (shown in Figure 1-16) to form the M220A2 TOW 2 launcher:

- Traversing unit.
- Digital MGS.
- AN/TAS-4A thermal night sight.

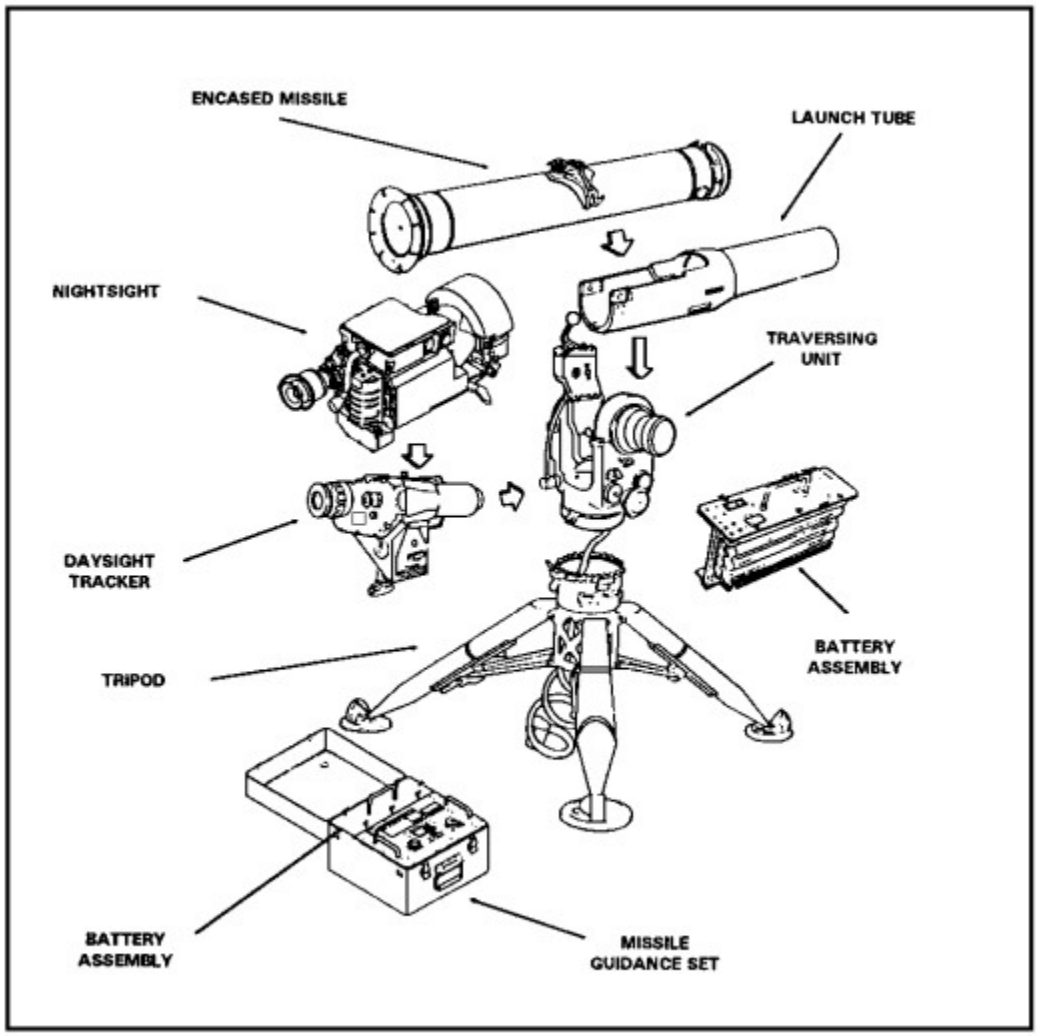

Figure 1-16. M220A2 TOW 2 Components.

The M220A2 TOW 2 weapon system weighs 256.5 pounds with all its components and carrying cases (shown in Figure 1-17). With the encased missile (BGM-71D), it weighs about 318.5 pounds.

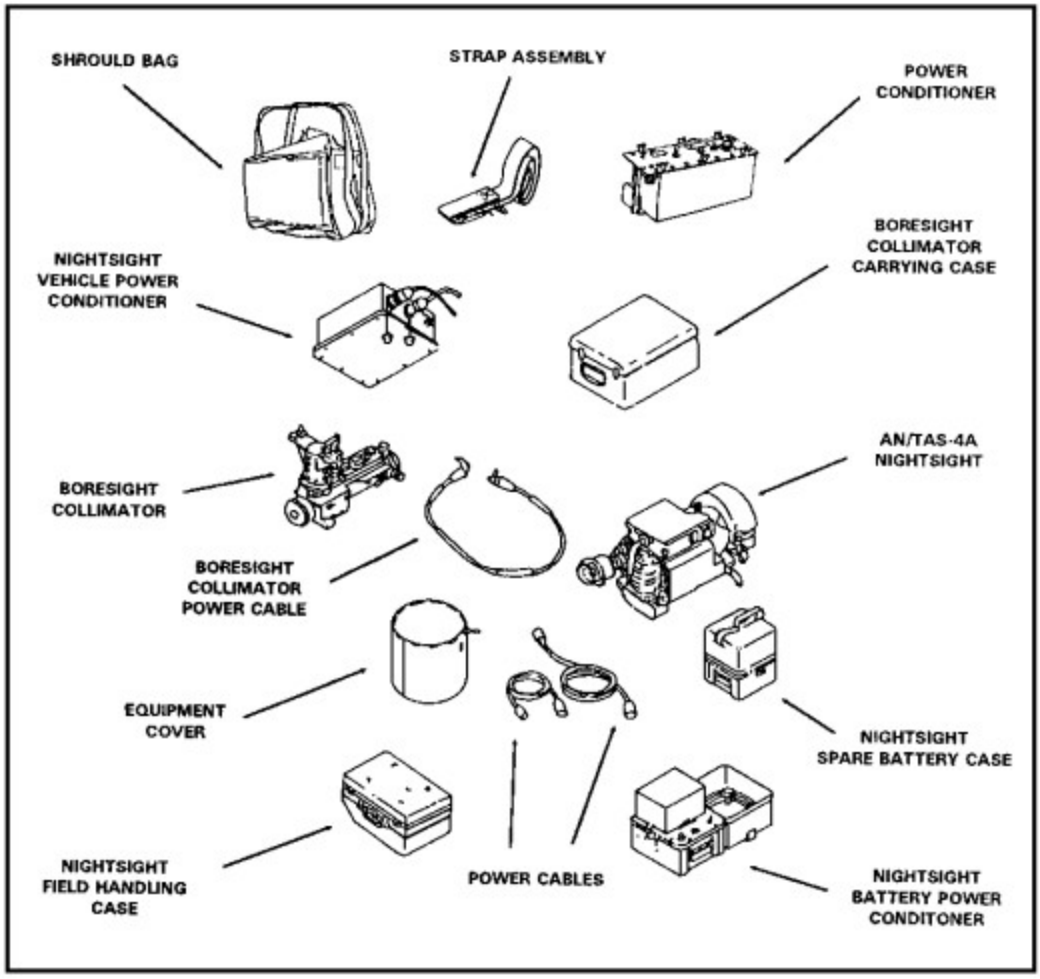

Figure 1-17. M220A2 TOW Components (Continued).

The TOW 2 missile (BGM-71D) improvements include the following items:

- New guidance-link.
- Full-caliber, six-inch warhead.
- Reloaded flight motor.
- Longer warhead probe.

The M220A2 TOW 2 launcher is compatible with all nine missile configurations. It can achieve a higher probability of hit against all types of targets through improved microprocessor-based electronics that use digital design techniques.

The TOW 2 weapon system introduces the following improvements to the TOW weapon system:

- TOW 2 Missile. The TOW 2 missile is engineered to be highly effective against heavy armor (tank) threats likely to appear on the battlefield in the late 1980s and early 1990s. It features a redesigned standoff probe, an

improved flight motor, a more robust warhead, and an additional tracking beacon.

- TOW 2 Warhead. The TOW 2 warhead, which is heavier, larger, and more powerful than the warheads of the I-TOW or the Basic TOW and occupies the full six-inch diameter of the missile. As with the I-TOW, the TOW 2 warhead incorporates a probe that extends after launch to provide standoff detonation and greater armor piercing effect.
- TOW 2 Flight Motor. To compensate for the increased weight of the TOW 2 warhead and other TOW 2 modifications, the TOW 2 flight motor is loaded with an improved propellant which provides a 30 percent greater impulse. Consequently, although the TOW 2 missile is heavier and more powerful than Basic TOW or I-TOW, its flight performance is not degraded by these modifications.
- Other Improvements. Improvements have been made to the following components of the TOW 2 weapon system, in addition to those made to the TOW 2 missile itself:
    - Guidance. The guidance for TOW 2 emphasized "hardening" the guidance link to overcome electro-optical countermeasures (EOCM) and stressed the development of system enhancements to permit day or night operation, even through dust, smoke, and other obscurants. These improvements, along with other ancillary changes, make the guidance system more accurate, flexible, and reliable.
    - Guidance Electronics. The missile guidance electronics are extensively upgraded for TOW 2. Dual digital microprocessors replace the analog computer used in the Basic TOW guidance electronics. The reengineered guidance electronics provide substantially greater computing capability, thereby providing more precise guidance. Additionally, the digital system offers the potential for more precise guidance equations, through software modifications, to accommodate new TOW missile developments such as TOW 2A and TOW 2B. Therefore, the Digital Missile Guidance Electronics are not only more powerful but also more accurate for all TOW missiles: Basic, I-TOW, TOW 2, and TOW 2A.
    - Sight/Sensor Assemblies. The basic functions of the sight/sensor assemblies are to provide the means target acquisition and target-missile tracking. Thus, the ability to guide the TOW 2 series missiles (TOW 2, TOW 2A, and TOW 2B) precisely through battlefield obscurants, day or night, is accomplished by the night sight. The night sight, employed in conjunction with the Optical Sight Sensor (OSS), provides dual, redundant tracking and guidance capability for the TOW 2 system.

- Tracking. As part of the TOW 2 system, a high-intensity thermal beacon is added to the aft (rear) end of the TOW 2 series missile designs to provide an infrared (IR) tracking source--different wavelength from the xenon beacon--visible to the night sight sensor. The xenon beacon of the Basic and the I-TOW designs is retained on the 2/2A missiles. As before, the distinctive infrared wavelength signature of the xenon beacon is used by the optical sight to track the TOW missile in clear visibility conditions. For maximum probability of a hit, the gunner need only choose one of the two sights to use. In either case, as the gunner tracks the target, the guidance loop senses the missile's deviation from the line-of-sight (LOS) to the target. These data are transmitted to the missile guidance electronics, which computes missile variance from the line-of-sight. Flight correction data are then transmitted to the missile via the wire link.

4. Missile Configuration.

Four configurations of TOW missiles may be used:

- BGM-71A.
- BGM-71A-1.
- BGM-71C.
- BGM-71D.

All missile configurations use the same basic airframe, aerodynamic control system, command-link wire, and missile electronic designs.

a. The Basic TOW Missile (BGM-71A). The basic TOW missile (BGM-71A) has a range of 3,000 meters (later improved, as the BGM-71A-1, to 3,750 meters) and has a five-inch-high explosive, shaped-charge warhead.

b. The Improved TOW (BGM-71C). The improved TOW (BGM-71C) has an improved five-inch warhead that includes an extensible probe to provide detonation at a greater standoff distance from the target and greater penetration effectiveness.

c. The TOW 2 (BGM-71D). The TOW 2 (BGM-71D) has a six-inch full-caliber warhead that also includes an extensible probe. In addition to the infrared radiator of the basic and the improved TOW versions, TOW 2 has a second infrared radiator to provide hardened system performance against battlefield obscurants and countermeasures. This second radiator, called the thermal beacon, provides tracking link compatibility with the electro-optical infrared night sight, which is part of the TOW 2 launcher system.

d. Destruction of the TOW Weapon System. In combat, it may be necessary to destroy the TOW components, vehicle, and missiles to prevent their capture. Destruction of parts by mechanical means, explosives, gunfire, or burning will make it useless to the enemy. The crew will destroy the weapon system only on

the commander's orders.

5. M151A2-Mounted TOW/TOW 2.

The M151A2-mounted TOW weapon system consists of two 1/4-ton vehicles: a firing vehicle and a missile carrier. The crew consists of four men: the squad leader, the gunner, the loader, and the driver-ammunition bearer. The squad leader and the gunner are on the firing vehicle. The loader and the driver-ammunition bearer are on the missile carrier.

a. Firing Vehicle. The M232A2 mounting kit equips the M151A2 firing vehicle (shown in Figure 1-18) for mounting and deploying the TOW. On the right side of the vehicle are special racks to carry two encased missiles. The traversing unit, the optical sight, the missile guidance set (MGS), the night sight, and the launch tube are installed in an operational ready state on the launcher mount. In preparation for travel, the launch tube is locked down in the eight-degree down position.

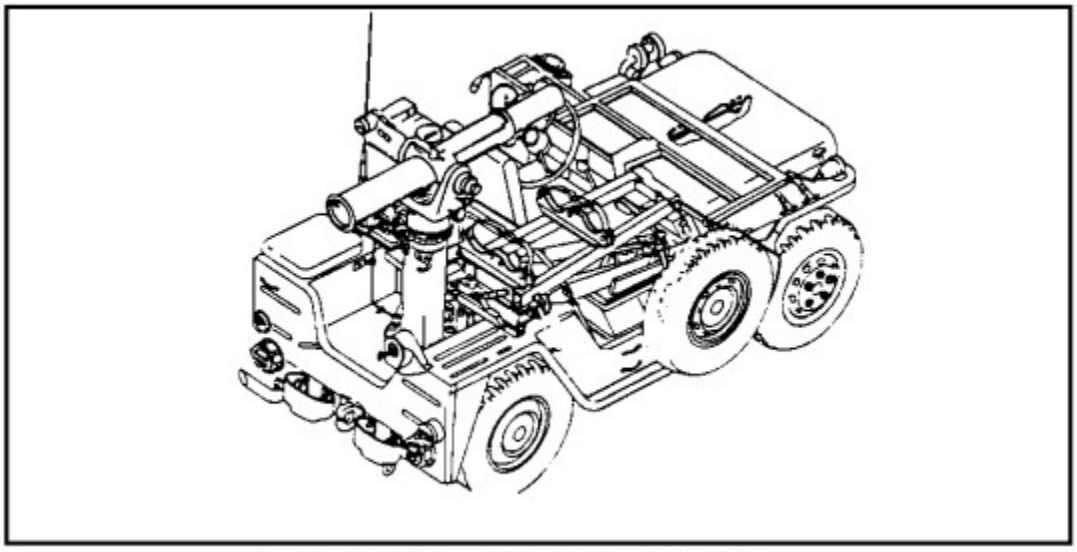

Figure 1-18. M151A2-Mounted TOW (Firing Vehicle).

The closed tripod is secured by straps in two supports beneath the missile racks. The missile racks pivot up to permit the removal of the tripod. The TOW vehicle power conditioner is stowed in the MGS, and the MGS is mounted on an elevated frame assembly on the floor of the vehicle, just forward of the launcher mount. The night sight spare battery power conditioner or coolant cartridge case is stowed under the radio mount behind the driver's seat. The night sight field handling case and storage rack is on the right side of the driver's seat, as shown in Figure 1-19. The launcher can be removed quickly from the firing vehicle for ground emplacement.

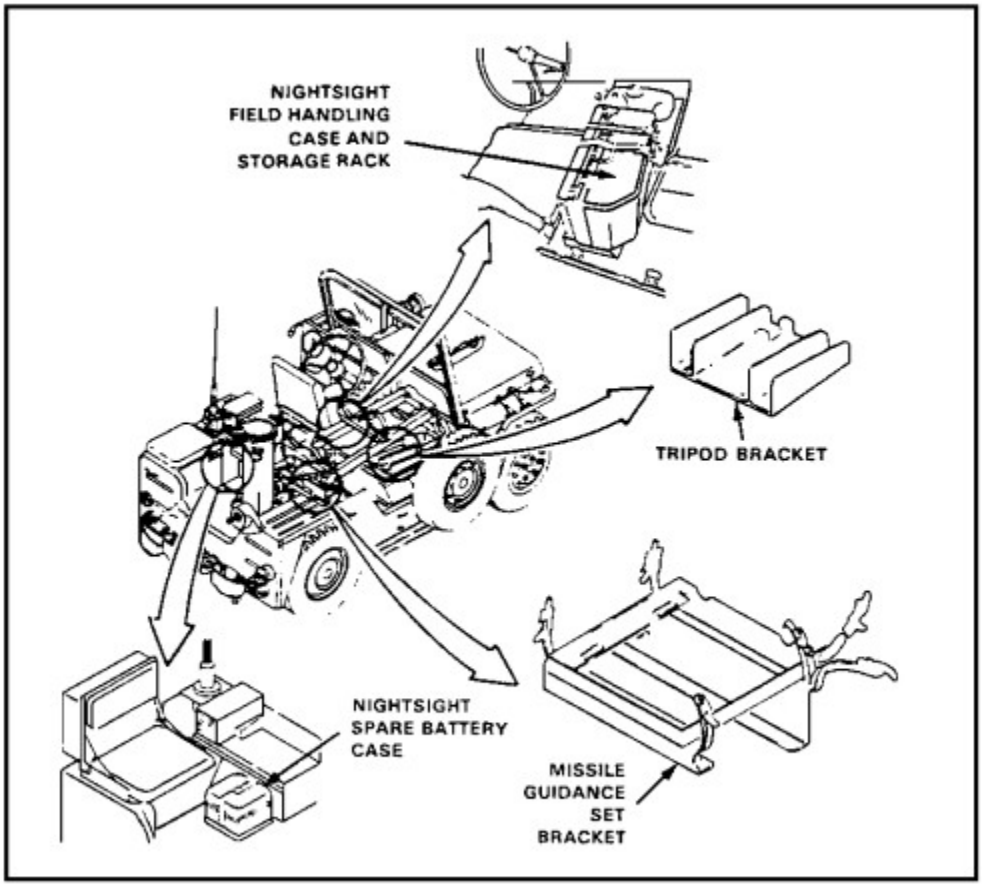

Figure 1-19. M151A2 Firing Vehicle and Equipment.

b. Missile Carrier. The M236A1 mounting kit equips the M151A2 missile carrier for carrying six encased missiles and a spare battery assembly. The mounting kit consists of the following components:

- Left rack assembly.
- Right rack assembly.
- Battery storage rack.
- Straps for the boresight collimator carrying case and the night sight battery and the coolant cartridge cases, as shown in Figure 1-20.

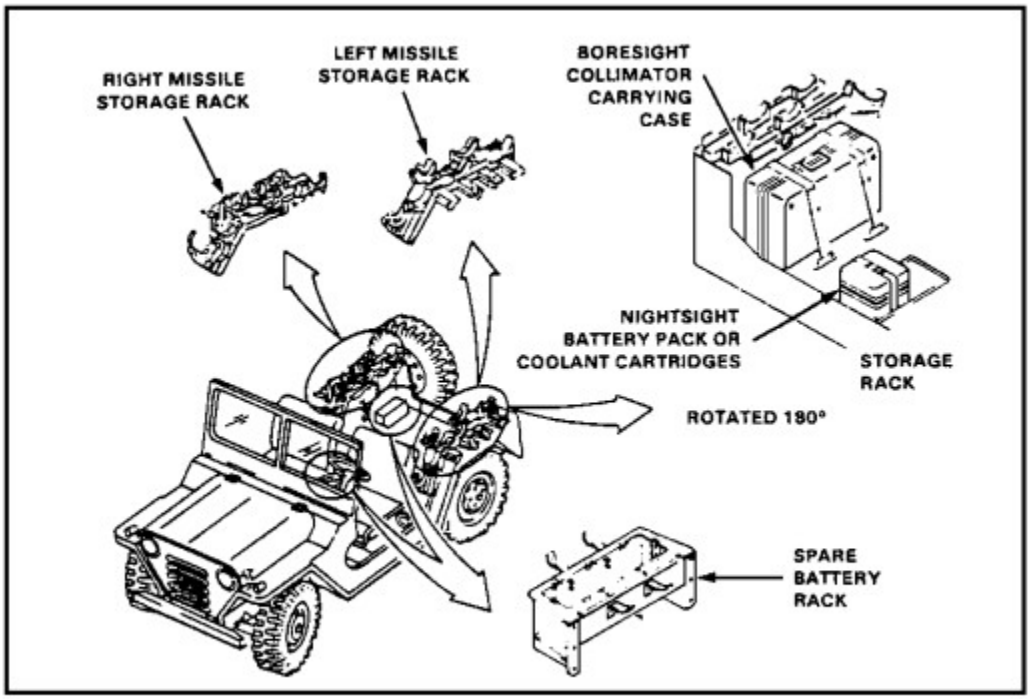

Figure 1-20. M151A2 Missile Carrier.

(1) Left Rack Assembly. The left rack assembly mounts over the left rear wheel. The rack is used to tie down the aft end of the six encased missiles. It also has hooks to prevent the lateral sliding of the encased missiles while traveling.

(2) Right Rack Assembly. The right rack assembly mounts over the right rear wheel. It is used to tie down the forward end of the six encased missiles.

(3) Battery Assembly Storage Rack. The battery assembly storage rack mounts between the front seats and provides stowage of a spare battery assembly.

(4) Boresight Collimator Carrying Case. The boresight collimator carrying case is strapped down in the left rear floor, under the missiles.

(5) Night Sight Battery and Coolant Cartridge Cases. The night sight battery and coolant cartridge cases are strapped down opposite the collimator case.

6. M966-Mounted TOW/TOW 2.

The M966-mounted TOW is a one-vehicle (1 1/4-ton truck) system, as shown in Figure 1-21. It is a comprehensive wheeled combat system that is air-transportable, versatile, maintainable, and survivable.

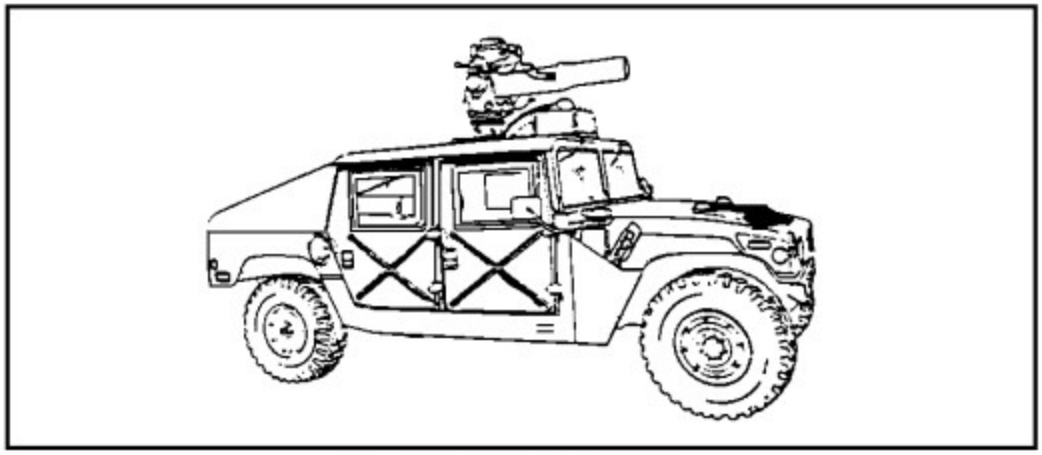

Figure 1-21. M966-Mounted TOW.

a. Characteristics and Capabilities. The following characteristics and capabilities provide the off-road mobility and speed that are needed in combat:

- 16-inch ground clearance.
- Four-wheel independent suspension.
- Steep approach and departure angles of 60-percent gradeability.
- Side slope of 40 percent.
- 30-inch (without kit) (60-inch, with kit) water-fording capability.

The vehicle carries one complete launcher system, six encased missiles, and a crew of three (squad leader, gunner, and driver-loader).

b. Equipment Storage. The TOW weapon system components are stored in the interior of the vehicle as follows:

- Six encased missiles are stowed in the missile racks on the left rear of the cargo area.
- The traversing unit is stowed on the traversing unit adapter behind the right front passenger seat.
- The missile guidance set is stowed on the gunner's platform, between the left and right rear passenger seat.
- The night sight and the collimator are stowed on the right cargo shelf.
- The launch tube is stowed on the right side of the cargo shell door.
- The battery power conditioner (BPC) and the spare battery pack or the night sight coolant cartridges and a 4.8-volt nickel cadmium battery are stowed on the floor bracket next to the right wall of the cargo shelf.
- The battery assemblies are stowed in the battery rack above the missile rack.

- The tripod is stowed retracted, lying across the rear of the cargo area.
- The TOW vehicle power conditioner (TVPC) is stowed in the missile guidance set.

7. M113A2-Mounted TOW (Basic).

The M113A2 Armored Personnel Carrier (APC) (shown in Figure 1-22) is a one-vehicle system equipped for mounting the TOW 2. The M113A2-mounted TOW weapon system has a crew of four:

- Squad leader.
- Gunner.
- Loader.
- Driver.

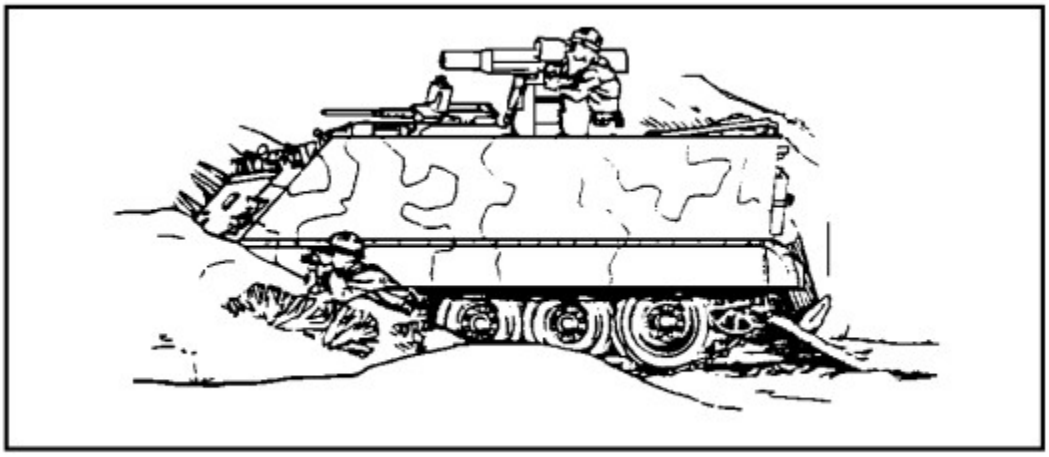

Figure 1-22. M113A2 Armored Personnel Carrier.

For protection against artillery and mortar fragments and small-arms fire, a TOW cover, artillery protection is installed.

a. M113A2 APC TOW System. The M233 mounting kit provides equipment for installing the TOW on the M113A2 and for stowing 10 encased missiles, a spare battery assembly, and all ground-emplacement components of the weapon system.

b. Equipment Storage. Equipment is stowed on the M113A2 APC in the following manner:

- Storing racks for the encased missiles are on the center, right side of the vehicle. You can easily remove and hand the missiles through the cargo hatch to the gunner on the gunner's platform.
- Stow the launch tube in the support mechanism just above the missile racks.
- Stow the closed tripod in an upright position so it is held by a quick-release clamp forward of the missile racks on the right side of the vehicle.

- The spare battery assembly is stowed in a storage rack just aft of the missile racks.
- The gunner's platform, in the raised position, provides the gunner with an elevated position, enabling him to operate the weapon system when the launcher is raised and ready to fire. The platform is hinged to the floor of the vehicle. Unlatch and lower it to the floor for more leg room during travel.
- Install the traversing unit and optical sight in an operational ready state on the telescoping pedestal. The pedestal mount provides stowage inside the vehicle and enables the gunner to raise the launcher onto a deck-firing position. The pedestal mount is mounted to double vertical rails that are pivoted at the vehicle floor. By unlocking these rails, the mount can be lifted aft and then elevated above and outside the deck of the vehicle. This requires some lifting effort by the operator, but this action is mostly supported by a set of constant tension springs which provide a counterbalance.
- The pedestal lock handwheel locks the pedestal into the pedestal locking bracket when the pedestal is in the lowered or the elevated position. The handwheel lock handle secures the pedestal lock handwheel.
- The telescoping pedestal release button is used in conjunction with the locking handle to lock the telescoping tube in the stowed (down) position. The locking handle locks the telescoping tube in any desired position from the stowed (down) position to the maximum telescoping height of 12 inches.
- The missile guidance set is installed in a bracket and strap assembly on the upper left side of the vehicle, just forward of the fuel tank and near the telescoping pedestal. The missile guidance set is electrically connected to the traversing unit by an 8 1/2-foot pedestal cable.
- The entire ground launcher system can be quickly removed from the vehicle for ground emplacement.

8. M901/M9O1A Improved TOW Vehicle (ITV).

The M901/M901A1 improved TOW vehicle is a one-vehicle weapon system. The M901 employs the M220A1 TOW. The M901A1 (shown in Figure 1-23) employs the M220A2 TOW 2. The improved TOW vehicle is manned by a crew of four:

- Squad leader.
- Gunner.
- Loader.
- Driver.

a. Characteristics. The M901-series improved TOW vehicle has the following characteristics:

- A complete M220-series TOW weapon system stowed and strapped in fixed mounting brackets. The optical sight and the night sight AN/TAS-4 or AN/TAS-4A are mounted in an operational ready state.
- A dual TOW missile launcher.
- M243 smoke grenade launchers.
- A 3X acquisition sight with a 25° field of view.
- Remote actuators that allow optical sight and night sight adjustments.
- An M60 machine gun mounted on a traversing rail.
- A hydraulically and electrically powered turret that can be operated manually.

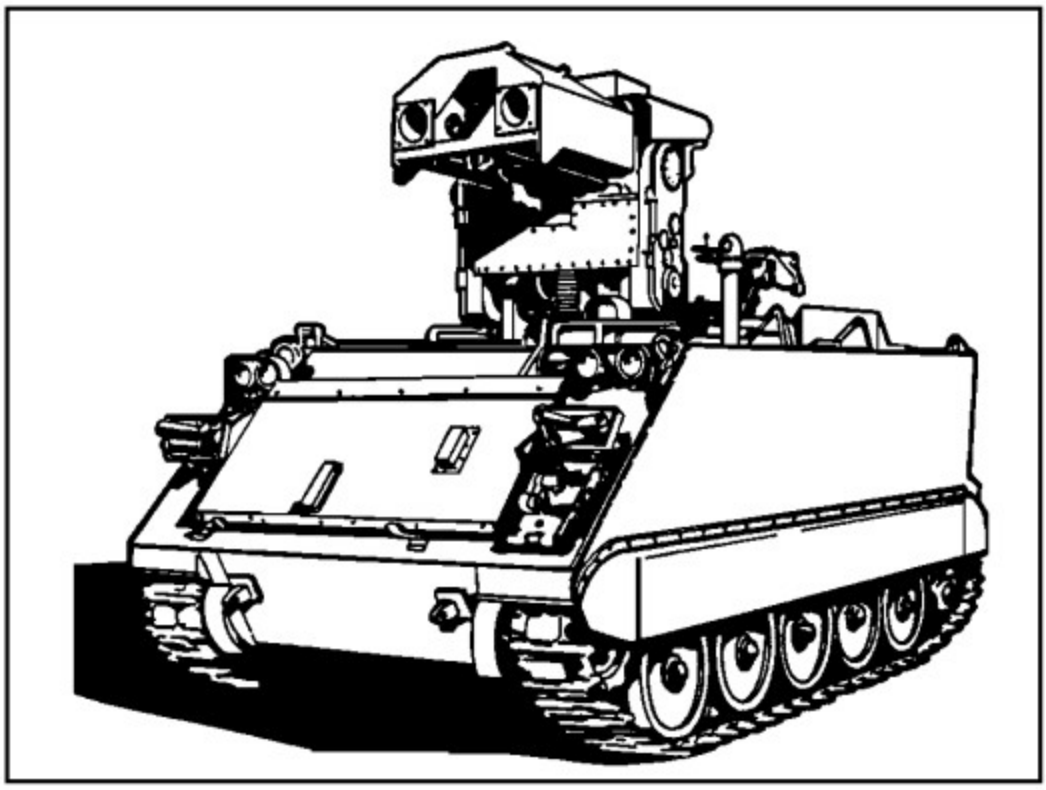

Figure 1-23. M901/M901A1 Improved TOW Vehicle (ITV).

b. Capabilities. The M901-series ITV has a high first-round hit probability with a rapid engagement rate. It provides the crew and weapon system protection from small-arms fire and artillery fragments. The squad leader has 270° viewing through the squad leader's periscope. The periscope enhances the ITV's capability to operate from concealed and full-hull defilade positions. The turret launcher has the capability for day and night acquisitions and tracking of targets and provides firing coverages of 360° in azimuth and +35° to -30° in elevation. The ITV has stowage provisions for tripod-mounted TOW components configured so that the

ground system can be dismounted and set up in three to five minutes. In addition, the ITV can ford small bodies of water (40 inches or less) and is air transportable.

9. AH-1S Cobra Attack Helicopter.

The AH-1S (G and S) Cobra helicopter (shown in Figure 1-24) is used in the support of military units as a combat gunship. Its primary mission is antiarmor, but the gunship can be used in close air support and air-to-air roles.

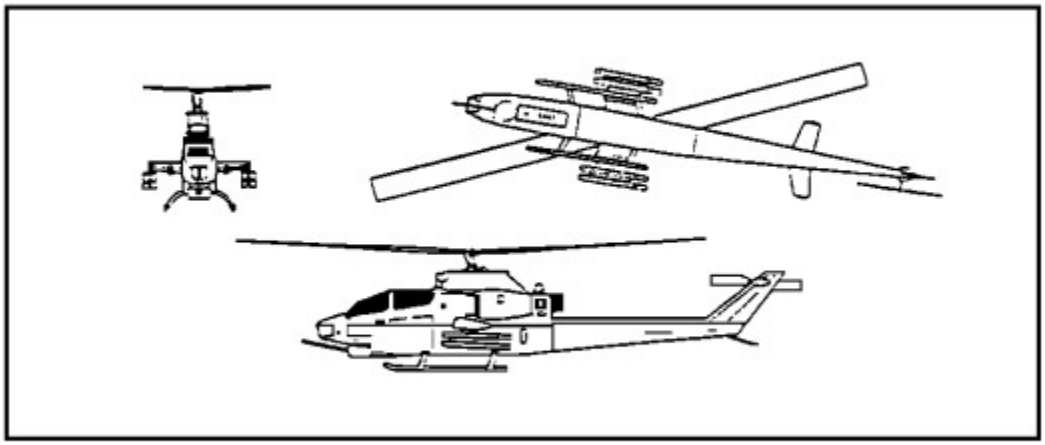

Figure 1-24. AH-1S Cobra.

a. Users. The AH-1S is used by the following countries:

- Iran.
- Israel.
- South Korea.
- Spain.
- United States.

b. Characteristics. The following characteristics of the AH-1S are used as recognition features:

- Two-bladed main rotor; two-bladed tail rotor.
- Single turbine engine.
- Long, slender fuselage with an integral chin turret.
- Swept-back vertical stabilizer.
- Small, tapered, swept-back wings aft of the canopy; the wings have armament stores.
- Seating capacity of two.

c. Capabilities. The capabilities of the AH-1S (speed, range, armament, weapon

range, and origin) are shown in Figure 1- 25.

Speed:	170 knots
Range:	410 km
Armament:	AH-1G Four 2.75-inch FFAR pods One 7.62-mm miniguns One 40-mm grenade launcher
	AH-1S Eight 130-mm TOWs Two 2.75-mm FFAR pods One 20-mm cannon
Weapon Range:	2.75-inch FFAR--5,500 meters (direct); 9,300 meters (indirect)
	7.62-mm gun--1,100 meters
	40-mm grenade launcher--2,000 meters 13-mm TOW--3,750 meters (new Improved TOW)
	20-mm cannon--1,500 meters
Origin:	United States

Figure 1-25. Capabilities of the AH-1S Gunship.

10. AH-64A Apache Attack Helicopter.

The AH-64A Apache helicopter (shown in Figure 1-26) is a totally integrated weapons system. Firepower options include up to 16 Hellfire missiles, 76 70-mm aerial rockets, and 1,200 rounds of 30-mm ammunition.

The availability of armament options for the AH-64A provides mission flexibility. The AH 64A has the following armament options:

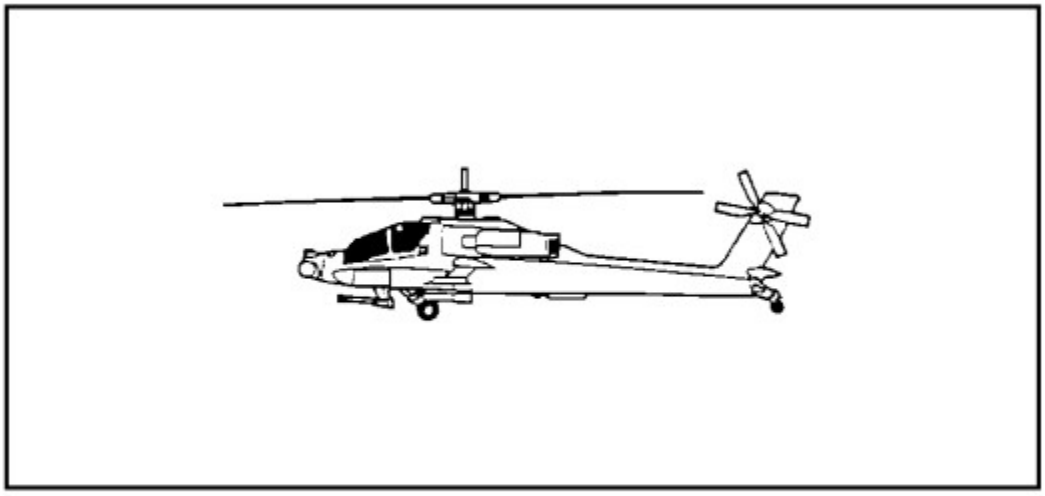

Figure 1-26. AH-64 Apache.

- Mission: antiarmor (Defense) Mid-East--Primary Mission 4,000 Feet/95 Degrees F. Four Hellfire missiles are under each wing of the helicopter, and the belly-mounted gun fires 320 rounds. Performance (based upon actual aircraft weight) is as follows:
    - Vertical rate of climb feet-per-minute (FPM) = 1,450.
    - Maximum level FLT speed KTS = 154.
    - Mission duration = 1.83 hours.
- antiarmor (Defense) Mid-East--4,000 Feet/95 Degrees F. Four Hellfire missiles are under each wing of the helicopter, and the belly-mounted gun fires 1,200 rounds. Performance (based upon actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 450.
    - Maximum level FLT speed (VH) KTS = 151.
    - Mission duration = 2.67 hours.
- antiarmor (Defense) Mid-East--4.000 Feet/95 Degrees F. Eight Hellfire missiles are under each wing and the belly-mounted gun fires 320 rounds. Performance (based upon actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 450.
    - Maximum level FLT speed (VH) KTS = 147.
    - Mission duration = 1.9 hours.
- antiarmor (Defense) Europe--2,000 Feet/70 Degrees F. Eight Hellfire missiles are under each wing of the helicopter, and the belly-mounted gun fires 1,200 rounds. Performance (based upon actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 990.
    - Maximum level FLT speed (VH) KTS = 148.
    - Mission duration = 2.5 hours.
- Covering Force (Air Cavalry) Mid-East--4,000 feet/95 Degrees F. Four Hellfire missiles are under each wing of the helicopter, and the belly-mounted gun fires 1,200 rounds. Performance (based upon actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 960.
    - Maximum level FLT speed (VH) KTS = l53.
    - Mission duration = 1.83 hours.
- Covering Force (Air Cavalry) Europe--2,000 Feet/70 Degrees F. Four Hellfire missiles and 19 rockets are under each wing of the helicopter, and the belly-mounted gun fires 1,200 rounds. Performance (based upon actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 860.

    - Maximum level FLT speed (VH) KTS = 150.
    - Mission duration = 2.5 hours.
- Airmobile Escort, Mid-East--4,000 Feet/95 degrees F. Nineteen rockets are under each wing of the helicopter, and the belly-mounted gun fires 1,200 rounds. Performance (based on actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 860.
    - Maximum level FLT speed (VH) KTS = 155.
    - Mission duration = 1.83 hours.
- Airmobile Escort, Europe--2,000 Feet/70 Degrees F. Thirty-eight rockets are under each wing of the helicopter, and the belly-mounted gun fires 1,200 rounds. Performance (based upon actual weight) is as follows:
    - Vertical rate of climb (IRP) FPM = 780.
    - Maximum level FLT speed (VH) KTS = 153.
    - Mission duration = 2.5 hours.

The Hellfire laser-guided missile subsystem is the primary armament, capable of defeating all currently known armored vehicles at significant standoff ranges. The use of Hellfire minimizes AH-64A engagement time and permits missile launching from concealed positions. Hellfire is employed using direct and indirect firing modes with single-fire, rapid-fire, and/or ripple-fire missile engagement. Normally, direct- and rapid-fire modes are fired autonomously by using the on-board laser to designate the target. Ripple- and indirect-fire modes are used in cooperative attacks with designation by other attack helicopters, laser-equipped scouts, RPVs, or remote ground designators. The indirect mode allows the Apache to destroy the armor of opposing forces while remaining masked and at extended ranges, enhancing effectiveness and survivability.

The 30-mm chain gun automatic cannon is the primary weapon subsystem, providing suppressive firepower and the capability to destroy lightly armored vehicles. The turreted cannon also provides self-protection from air threats. This weapon system is usually operated by the copilot/gunner, using the Target Acquisition Designation Sight (TADS), but it may also be directed by either crew member, using the helmet-mounted sight. The cannon uses high explosive dual-purpose rounds with exceptional terminal effects and is ADEN/DEFA ammunition compatible.

Another firepower option consists of 70-mm Folding-Fin Aerial Rockets (FFAR), which have been a standard U. S. Army and NATO munition for many years. However, new developments for the 70-mm FFAR--such as the Mark 66 motor, the Multipurpose Submunition Warhead, and articulating pylons--have significantly enhanced the effectiveness of this system. The aerial rockets may be fired either by either crew member with aiming and steering commands shown on the helmet display or in conjunction with the TADS for increased accuracy. The crew can select fuse ranges or tree heights to control detonation, as well as launching modes (single, pairs, or quads), launching rate, quantity launched, and zone launching.

All weapons systems are directed through a fire control computer which significantly

enhances target hit probability. By pre-pointing weapons and computing precise ballistic trajectories, the fire control computer reduces the time required to acquire targets and provides the best weapons system performance ever achieved in an attack helicopter.

The AH-64A Apache helicopter is used in the support of military units as a combat gunship. The primary mission of the AH-64A Apache is antiarmor, but the gunship can be used in close air support and air-to-air roles.

a. User. The AH-64A Apache helicopter is used by the United States.

b. Characteristics. The following characteristics of the AH64A Apache helicopter are used as recognition features:

- Four-bladed main rotor; four-bladed tail rotor.
- Twin turbine engines.
- Two-place tandem seats.
- Flat-plate canopy.
- Wheel-type landing gear.
- Fixed wings with armament stores.
- Belly-mounted gun.
- Seating capacity of two.

c. Capabilities. The capabilities of the AH-64A Apache (speed, range, armament, weapon range, and origin) are shown in Figure 1-27.

Speed:	140 knots
Range:	690 km
Armament:	One 30-mm chain gun
	One to four 2.75-inch FFAR pods One to 16 HELLFIRE modular missile systems (HMMSs)
Weapon Range:	30-mm chain gun--1,500 meters
	FFAR pods--9,600 meters
	HELLFIRE--6,000 meters (unclassified)
Origin:	United States

Figure 1-27. Capabilities of the AH-64A Apache Gunship.

PART C - TOW/TOW 2 MISSILE TYPES AND MARKING

1. Missile Types.

The TOW missile is the only ammunition used with the TOW/TOW 2 weapon systems. This missile is encased in a launch container (missile case) which is put into the launcher when it is ready to use.

a. Practice Types. The encased missile comes in four practice types. Each practice type contains an inactive (inert) warhead. The four practice types of TOW missiles are:

- BTM-71A (normal range).
- BTM 71A-1 (extended range).
- BTM 71A-2 (normal range) with the Missile Ordnance Inhibit Circuit (MOIC).
- BTM 71A-3 (extended range) with the MOIC.

b. Attack Types. The encased missile also comes in seven attack types, each of which contains a high-explosive warhead:

- BGM 71A (normal range).
- BGM 71A-1 (extended range).
- BGM 71A-2 (normal range, with MOIC).
- BGM 71A-3 (extended range, with MOIC).
- BGM 71C (with an improved, five-inch warhead).
- BGM 71C-1 (with an improved five-inch warhead and MOIC).
- BGM 71D (TOW 2).

Figure 1-28 shows the length, diameter, volume, weight, explosive weight (approximate), (warhead, launch and flight motor weights) for both the four practice- and the seven attack-type missiles.

	Guided Missile, Surface Attack, BGM 71A, BGM 71A-1 BGM 71A-2, BGM 71A-3 BGM 71C, BGM 71C-1 and BGM 71D	Guided Missile, Practice (Inert Warhead, Live Motor) BTM 71A BTM 71A-1, BTM 71A-2, and BTM 71A-3
Length	50.6 in. (128.4 cm)	50.6 in. (128.4 cm)
Diameter	8.6 in. (21.9 cm)	8.6 in. (21.9 cm)
Volume	1.7 cu. ft. (48.1 l)	1.7 cu. ft. (48.1 l)
Weight	54.2 lbs. (24.6 kg) 62.4 lbs.** (28.4 kg)	54.2 lbs. (24.6 kg)
Explosive Weight (approx.)		
Warhead	5.3 lbs. (2.4 kg) 4.5 lbs.* (2.0 kg) 6.8 lbs.** (3.1 kg)	None
Launch Motor	1.2 lbs. (0.55 kg)	1.2 lbs. (0.55 kg)
Flight Motor	5.6 lbs. (2.5 kg) 7.0 lbs. ** (3.2 kg)	5.6 lbs. (2.5 kg)

* BGM 71C and BGM 71C-1
** BGM 71D

Figure 1-28. TOW Encased Missile Data Chart.

2. TOW/TOW 2 Missile Types.

Since the development of the TOW missile, nine different types have been fielded.

a. Basic TOW. The first four (identified as Basic TOW) have basically the same characteristics, with an improvement in range from 3,000 to 3,750 meters.

b. Improved TOW (I-TOW). Two Improved TOW missiles (I-TOWs BGM 71C and BGM 71C) introduced an extended probe enhancing armor penetration.

Figure 1-29 lists the different types of TOW/TOW 2 missiles and shows the following information about each type:

- how it is designated.
- its maximum range.
- its type of warhead.

c. TOW 2-Series. The TOW 2-series of missiles represent still further improvements to the Basic and Improved TOW missiles.

To identify missiles by their types, refer to the missile case identification markings in Part C, paragraph 4.

3. Distinguishing Characteristics.

The TOW missile can destroy targets at a minimum range of 65 meters, up to a maximum

range of 3,750 meters. Five TOW missiles are of great concern:

a. Improved TOW (I-TOW). The I-TOW (BGM 71C) missile has a five-inch warhead which includes an extended probe to provide detonation at a greater stand-off distance from the target, thus increasing armor penetration.

NOTE: The perception of "standoff" to mean "engage armor vehicles beyond 2,000 meters to maximum range (3,750 meters)" is not always tactically feasible. Reasons include: (1) Tracking time beyond 2,000 meters increases the likelihood of gunner error and provides the enemy additional reaction time to maneuver against your position. (2) The probabilities of a hit at extended ranges are significantly lower, especially through thermal sights and obscuration. (3) Ranges beyond 2,000 meters decrease the probability of flank shot hits due to extended tracking time, the increased speed capability of modernized vehicles, and terrain restrictions.

Refer to Figure 1-29 for information concerning the targets for which TOW 2 missiles are most effective.

c. TOW 2 Missiles. There are three TOW 2-series missiles: TOW 2 (BGM 71D); the TOW 2A (BGM 71E), and the TOW 2B (BGM 71F). The distinguishing characteristics of these missiles are described in the following paragraphs:

- TOW 2 (BGM 71D). The TOW 2 missile (BGM 71D) has a six-inch, full caliber warhead which includes an extensible probe which enhances penetration, including the penetration of applique armor.
- TOW 2A (BGM 71E). The TOW 2A (BGM 71E) missile is an improvement to the basic TOW missile. It was developed to keep the TOW antitank system viable against advanced armor fielded by opposing forces. As all the other members of the TOW missile family, TOW 2A can be fired from any of the existing TOW platforms (the Bradley Fighting Vehicle, the High Mobility Multipurpose Wheeled Vehicle, the AH-1 helicopter, the M113 armored personnel carrier, and the tripod ground mount). However, to optimize TOW 2A capabilities, minor software changes to the missile guidance electronics have been developed. There are no additional training requirements for TOW gunners as a result of fielding the TOW 2A missile. The TOW 2A has all the capabilities of the TOW 2 missile. However, it contains an explosive charge in the tip of the probe to defeat reactive armor to allow penetration by the main warhead: The precursor warhead in the missile probe is designed to set off the explosive in a tank's reactive armor, clearing the way for the primary warhead to penetrate the tank. The primary warhead employed on the TOW 2A missile is the same as that used on the TOW 2 missile, and the two missiles are almost identical in appearance.
- TOW 2B (BGM 71F). Refer to Lesson Three, Part A, for information concerning the TOW 2B (BGM 71F) missile.

d. Basic TOW, Practice Round ((BTM 71A). The Basic TOW, practice (BTM 71A) has an inert warhead and is the standard training round.

Type	Designator HEAT	Inert Practice	Maximum Range (Meters)	Warhead	Comments
Basic TOW	BGM 71A	BTM 71A	3,000	5-Inch UNITARY	
Basic TOW	BGM 71A-1	BTM 71A-1	3,000	5-Inch UNITARY	
Basic TOW	BGM 71A-2	BTM 71A-2	3,000	5-Inch UNITARY	*
Basic TOW	BGM 71A-3	BTM 71A-3	3,750	5-Inch UNITARY	**
I-TOW	BGM 71C	NONE	3,750	5-Inch UNITARY W/PROBE	
I-TOW	BGM 711C-1	NONE	3,750	5-Inch UNITARY W/PROBE	
TOW 2	BGM 71D	NONE	3,750	6-INCH UNITARY W/PROBE	***
TOW 2A	BGM 71E	NONE	3,750	6-Inch TANDEM W/PROBE TIP CHARGE	** ***
TOW 2B	BGM 71F	NONE	3,750	FLYOVER, SHOOT DOWN	

* The MOIC (missile ordnance inhibit circuit) prevents the fly-back of a missile if a command link (wire) breaks.

** The ECM (electronic countermeasure) is resistant when the missile is fired through the TOW 2 launcher/subsystem.

*** The probe tip charge first penetrates the explosive reactive armor boxes and then allows the main six-inch warhead to penetrate the basic hull armor. An excellent means of engaging enemy tanks.

Figure 1-29. Fielded TOW/TOW 2 Missile Types.

4. Missile Marking.

NOTE: The markings described in this paragraph and shown in Figures 1-30 through 1-35 are new; they are not yet used in the field.

TOW/TOW 2 missiles are identified by markings on their missile cases (shown in Figures 1-30 through 1-35). On the left side of the nose end of the missile case, an identification decal identifies the missile as being a 71A, 71A-1, 71C, 71D, 71E,

or 71F.

To the right of the identification decal, there is a two-inch-wide identification tape. This tape, which identifies the type of missile encased in the missile case, is either blue (71A) or yellow (71A1, 71C, 71D, 71E, and 71F).

At the middle of the left side of the missile case (to the right of the identification tape) is the Lot Number and Storage Temperature Limits. The Lot Numbers change, but the Storage Temperature Limits for all types of TOW/TOW 2 missiles is the same (-65 degrees F to +155 degrees F).

To the right of the Lot Number and Storage Temperature Limits data, toward the aft (rear) end of the missile case, is a two-inch-wide strip of brown tape.

On the rear end of the missile case is a circular stencil which again identifies the type of missile as being 71A, 71A-1, 71C, 71D, 71E, or 71F.

On the top side of the missile case, midway between the nose and the aft ends of the case is stenciled the missile type and its respective maximum range.

5. Missile Selection.

The improvement of the armor protection of opposing forces' vehicles has resulted in improved TOW missiles. Figure 1-35 recommends the best TOW missile to use against various types of targets. In all cases, flank shots increase the probability of a single shot kill and minimize detection and engagement from opposing forces' armor.

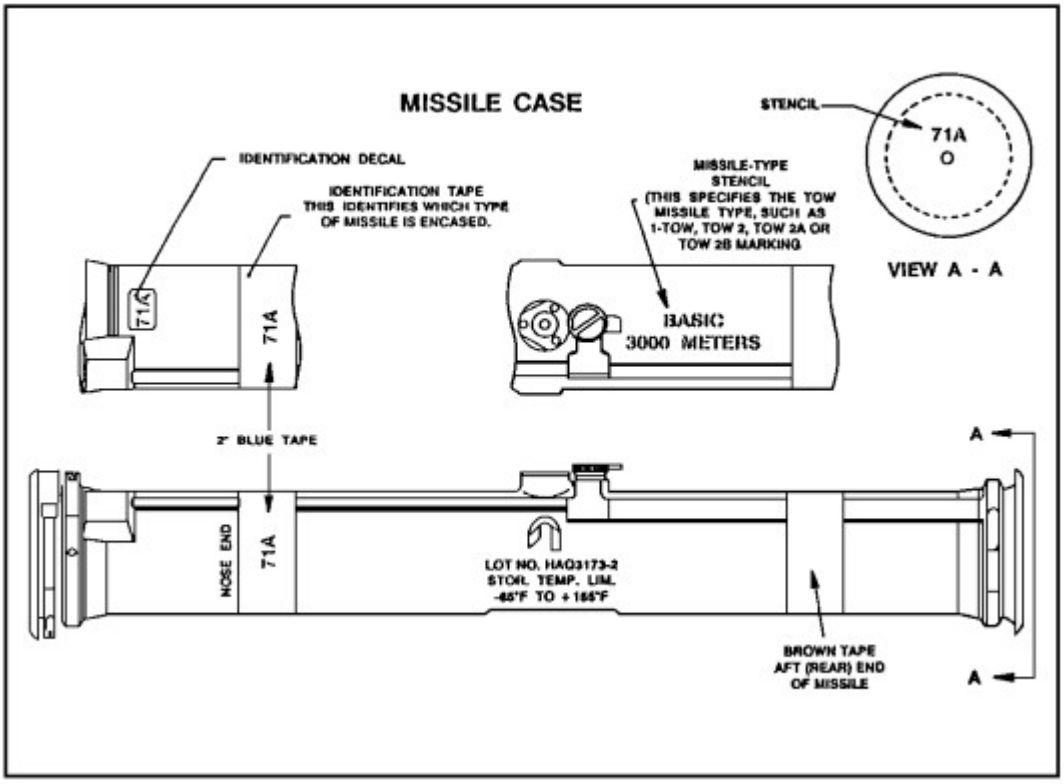

Figure 1-30. Missile Markings for Identification (BGM 71A).

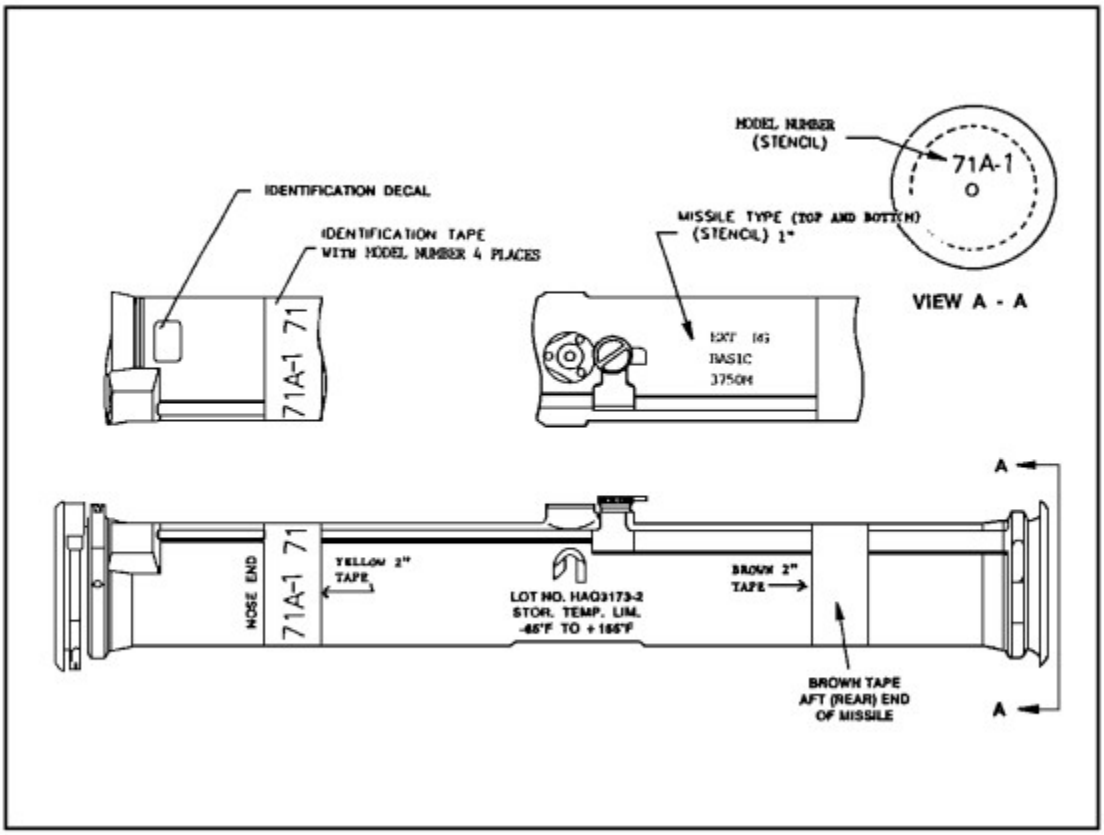

Figure 1-31. Missile Markings for Identification (BGM 71A-1).

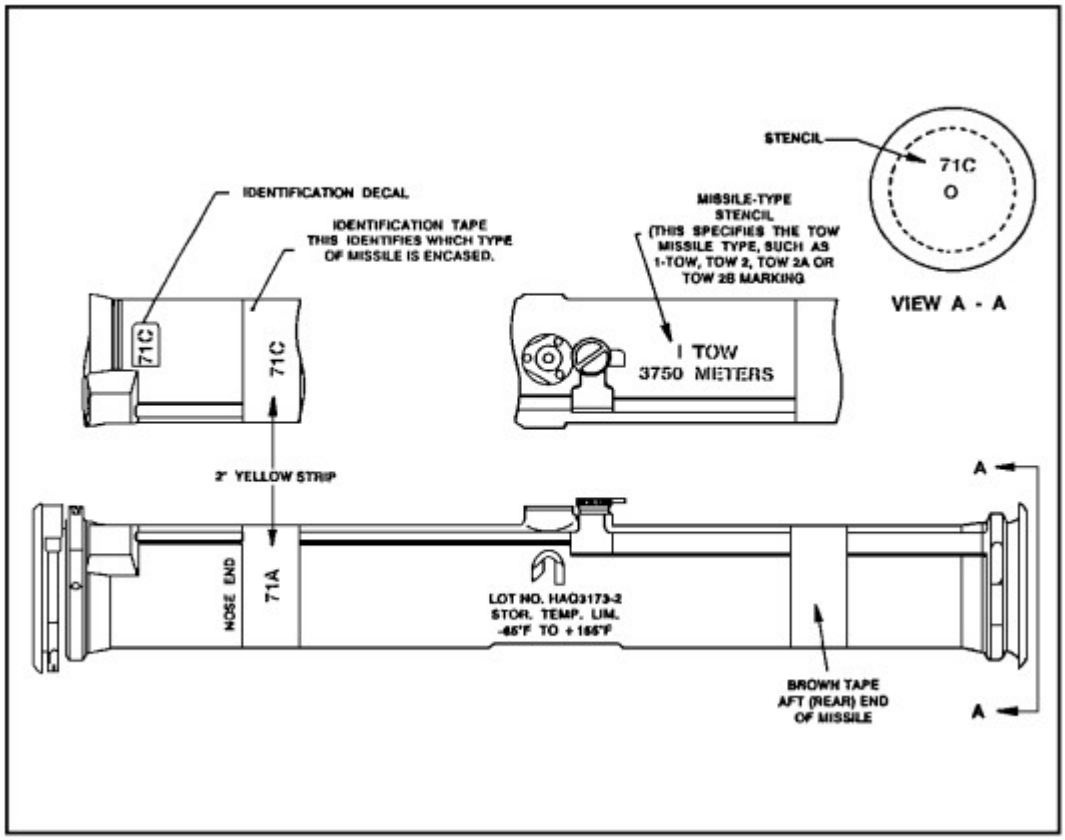

Figure 1-32. Missile Markings for Identification (BGM 71C).

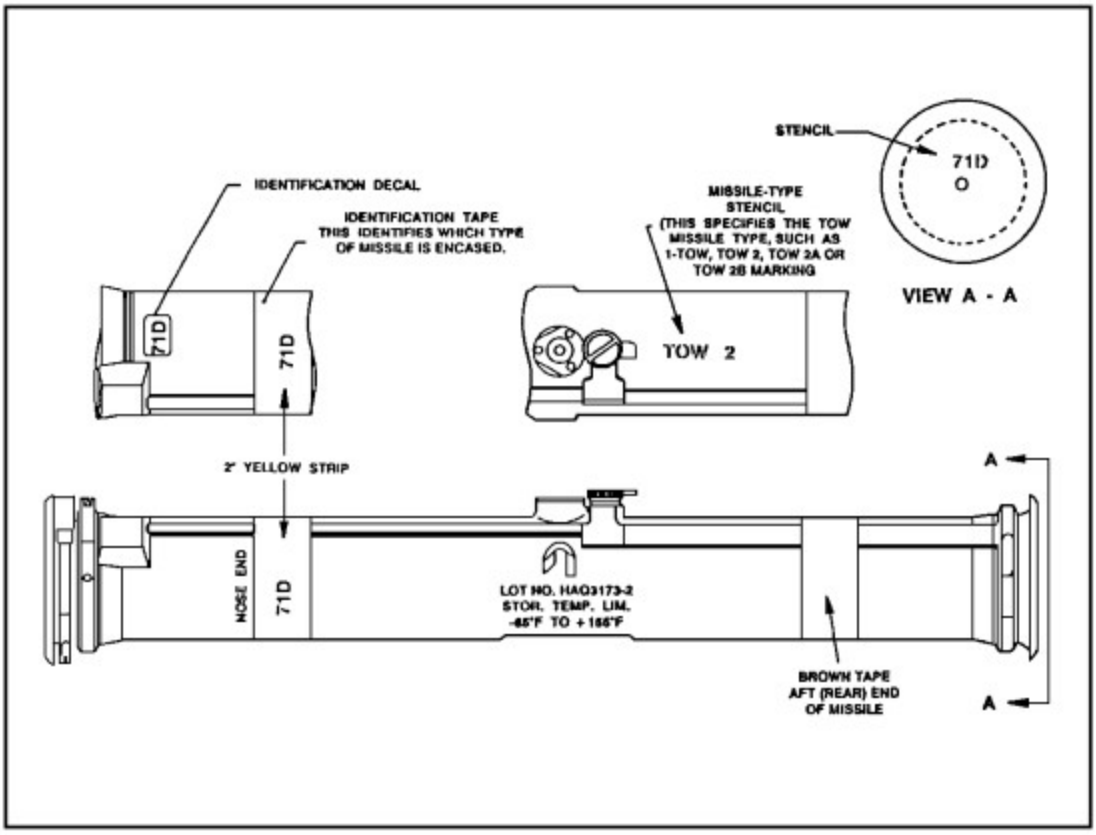

Figure 1-33. Missile Markings for Identification (BGM 71D).

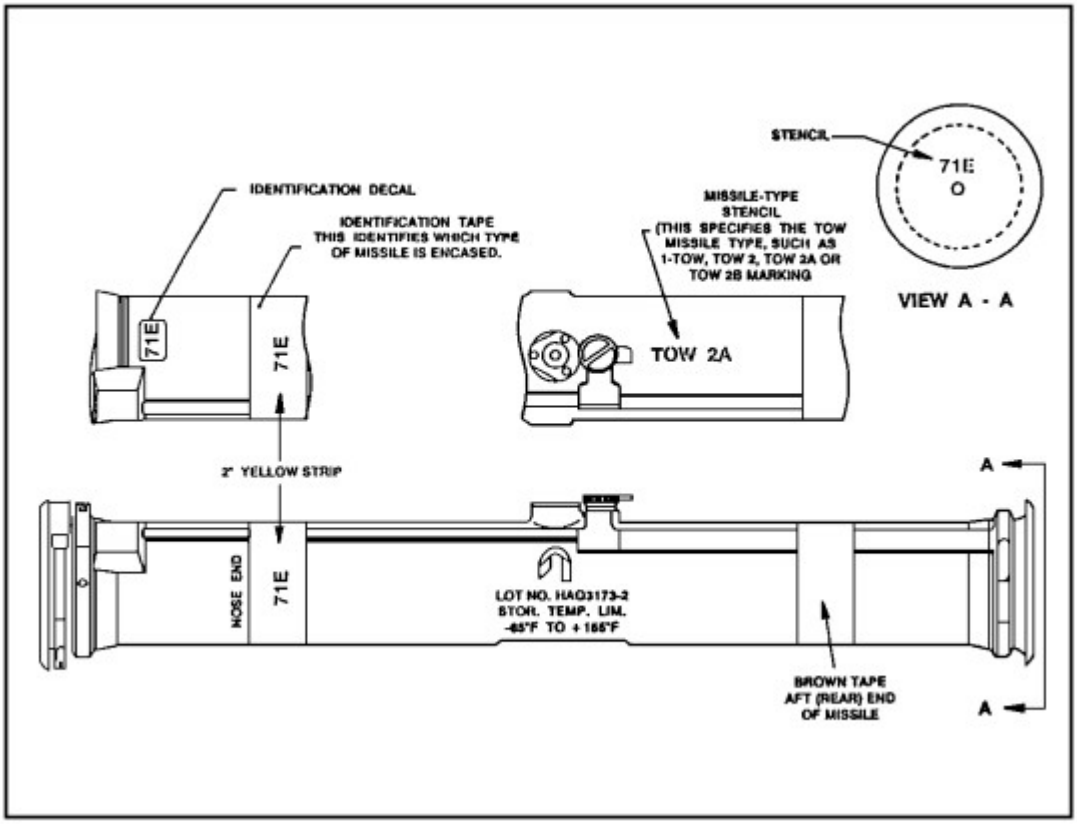

Figure 1-34. Missile Markings for Identification (BGM 71E).

Opposing Force's Vehicle Type Targets	TOW Missile Selection Priority 1st	2nd	3rd	4th
Tanks w/ applique armor	TOW 2	TOW 2A	TOW 2B	I-TOW
Tanks w/explosive reactive armor	TOW 2B	TOW 2A	TOW 2	I-TOW
Tanks without applique/ reactive armor	I-TOW	TOW 2	TOW 2A	TOW 2B
Light-armored personnel carriers	I-TOW	TOW 2	TOW 2A	TOW 2B
Light-armored wheel vehicles	I-TOW	TOW 2	TOW 2A	TOW 2B
Antiaircraft vehicles	I-TOW	TOW 2	TOW 2A	TOW 2B
Armored vehicles in hull defilade position	TOW 2B	TOW 2A	TOW 2	I-TOW
Bunkers/fortifications	I-TOW	TOW 2	TOW 2A	------

Figure 1-35. Missile Selection Chart.

Lesson 2

CURRENT OPPOSING FORCES antiarmor WEAPONS

OVERVIEW

Lesson Description:

In this lesson, you will learn to identify the characteristics of the following opposing forces antiarmor weapons: RPG-7V Antitank Grenade Launcher; RPG-16D Antitank Grenade Launcher; RPG-18 Antitank Rocket Launcher; RPG-22 Rocket Launcher; SPG-9 Antitank Recoilless Gun; MT-12 Antitank Gun; AT-2/SWATTER; AT-3/SAGGER; AT-4/SPIGOT; AT-5 SPANDREL; AT- 6/SPIRAL; AT-7 SAXHORN; and AT-8/SONGSTER.

Terminal Learning Objective:

Action:	Identify the characteristics of the following opposing forces antiarmor weapons: RPG-7V Antitank Grenade Launcher; RPG-16D Antitank Grenade Launcher; RPG- 18 Antitank Rocket Launcher; RPG-22 Rocket Launcher; SPG-9 Antitank Recoilless Gun; MT-12 Antitank Gun; AT-2/SWATTER; AT-3/SAGGER; AT-4/SPIGOT; AT- 5 SPANDREL; AT-6/SPIRAL; AT-7 SAXHORN; and AT-8/SONGSTER.
Condition:	Given the subcourse material contained in this lesson.
Standard:	Identify the characteristics of the RPG-7V Antitank Grenade Launcher; RPG-16D Antitank Grenade Launcher; RPG-18 Antitank Rocket Launcher; RPG-22 Rocket Launcher; SPG-9 Antitank Recoilless Gun; MT-12 Antitank Gun; AT-2/SWATTER; AT-3/SAGGER; AT-4/SPIGOT; AT-5 SPANDREL; AT-6/SPIRAL; AT-7 SAXHORN; and AT-8/SONGSTER.
References:	The material contained in this lesson was derived from the following publications: FM 1-402 FM 100-2-3 FM 23-33 FM 23-34 FM 1-402

INTRODUCTION

The Soviet arsenal of antitank weapons ranges from grenade and rocket launchers through antitank guns and guided missile systems.

PART A - ANTITANK GRENADE AND ROCKET LAUNCHERS

1. Antitank Grenade Launchers.

The following are Soviet antitank grenade launchers:

- RPG-7V.
- PG-16D.
- RPG-7V.

a. RPG-7V Grenade Launcher. The following paragraphs discuss the RPG-7V Grenade Launcher (shown in Figure 2-1).

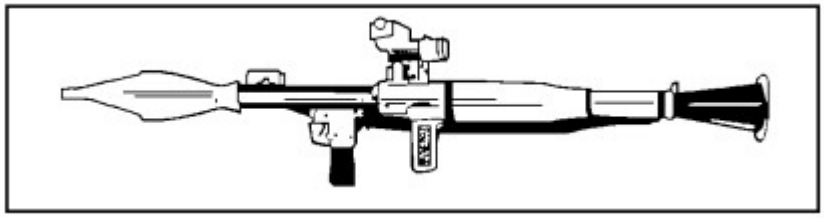

Figure 2-1. Antitank Grenade Launcher RPG-7V.

(1) Description. The RPG-7V is a recoilless, shoulder-fired, muzzle loaded, reloadable antitank grenade launcher. It fires an 85-mm (PG-7) or a 70-mm (PG-7M) rocket-assisted HEAT grenade from a 40-mm smooth-bore launcher tube. The launcher has two handgrips; a large optical sight; a thick, wooden heat guard around the middle; and a large, flared blast shield at the rear of the tube. The launcher is 953 millimeters long without the grenade, and 1,340 millimeters long with the PG-7 grenade. The launcher weighs 7.9 kilograms and the PG-7 grenade weighs 2.25 kilograms.

(2) Capabilities. The RPG-7V is light enough to be carried and fired by a single soldier. However, an assistant grenadier normally deploys to the left of the gunner to protect him with small-arms fire. The grenadier normally carries two rounds of ammunition and the assistant grenadier carries three additional rounds.

The RPG-7V is an improved version of the earlier RPG-2. The RPG-2 had only one handgrip; a smaller, simpler sight; a smaller blast shield; and no heat guards. It fired a smaller, 80-mm, non-rocket-assisted grenade. The internal rocket motor of the PG-7/-7M grenade ignites after traveling about 11 meters; this gives the projectile a higher velocity (sustained out to 500 meters), a flatter trajectory, and better accuracy. Further enhancing accuracy are four large, knife-like fins at the rear of the projectile which

unfold when the round leaves the tube, and smaller, offset fins at the very rear which impart a slow rotation. The maximum effective range is 500 meters for stationary targets and 300 meters for moving targets. Maximum range is 920 meters, at which point the projectile self-destructs (approximately 4.5 seconds after launch). The PG-7/-7M grenade, with a shaped-charge warhead can penetrate 330 millimeters of armor with a direct hit.

The current RPG-7V model can mount a telescope and both infrared and passive night sights. All RPG-7 models have optical sights which can be illuminated for night sighting. They also have open sights for emergency use. The RPG-7V is the standard squad antitank weapon in motorized rifle units (each squad has one weapon). The weapon is also found with reconnaissance units. Airborne units use the RPG-7D which separates into two sections.

(3) Limitations. The RPG-7V requires a well-trained and experienced gunner to accurately estimate ranges and lead distances for moving targets. Crosswinds as low as seven miles an hour can complicate the gunner's estimate and reduce first-round-hit probability to 50 percent at ranges beyond 180 meters. An RPG projectile screen of chain-link fence will completely neutralize 50 percent of the rounds and degrade the penetrating capability of the remaining rounds. Reloading and reaiming the AT grenade launcher takes a minimum of 14 seconds. The RPG-7V has a conspicuous signature: flash, smoke, and noise. The unprotected gunner is extremely vulnerable to suppressive fires.

(4) Remarks. The first Soviet recoilless AT grenade launcher, the RPG-2, was derived from the World War II German Panzerfaust. The Soviets first fielded it in the early 1950s. The RPG-7, introduced in 1962, is a second-generation weapon employing a rocket-assisted projectile. The current version, designated the RPG-7V, is in service throughout the Warsaw Pact with the exception of Czechoslovakia. The folding version for airborne forces, introduced in 1968, was initially known as the RPG-8, but later redesignated the RPG-7D. A third-generation weapon, the RPG-16D, incorporates further refinements resulting from battle testing the RPG-7V in southeast Asia and the Middle East. It has replaced the RPG-7D as the standard squad AT weapon in Soviet airborne forces.

b. Antitank Grenade Launcher RPG-16D. The following paragraphs discuss the RPG-16D Grenade Launcher (shown in Figure 2-2).

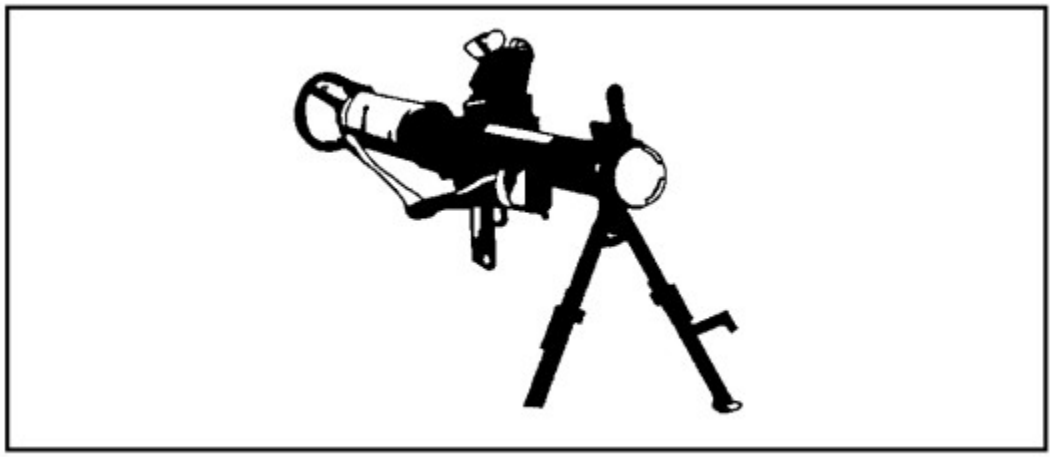

Figure 2-2. AT Grenade Launcher RPG-16D.

(1) Description/Capabilities. The RPG-16D is a reloadable antitank weapon. It is shoulder fired, either with or without the support of a bipod at the muzzle end. It has an optical sight above the tube, a single hand grip below the tube, and a conical blast shield at the rear. The 58.3-meter rocket-assisted HEAT projectile PG-16 has an increased range of 500 to 800 meters and a greater armor penetration capability of up to 375 millimeters, compared to the PG-7/-7M projectile of the RPG-1V (33-mm). As with the RPG-7, the RPG-16D grenadier probably carries two rounds of ammunition. The assistant grenadier likely carries an additional three rounds and protects the grenadier with his assault rifle.

(2) Limitations. The RPG-16D is heavier than the RPG-17V/-D -- but one person can still carry and fire the antitank weapon.

(3) Remarks. The Soviets introduced the RPG-16D in the mid-1970s as a replacement for the RPG-1D. Western observers also expected a one-piece version (RPG-16?) to replace the RPG-7V in motorized rifle units; however, the Soviets have not yet deployed such a weapon. To date, only the airborne forces have been observed with the two-piece airborne version designated the RPG-16D.

2. Antitank Rocket Launchers.

The following are Soviet antitank rocket launchers:

- RPG-18.
- RPG-22.

a. AT Rocket Launcher RPG-18. The following paragraphs discuss the RPG-18 Rocket Launcher (shown in Figure 2-3).

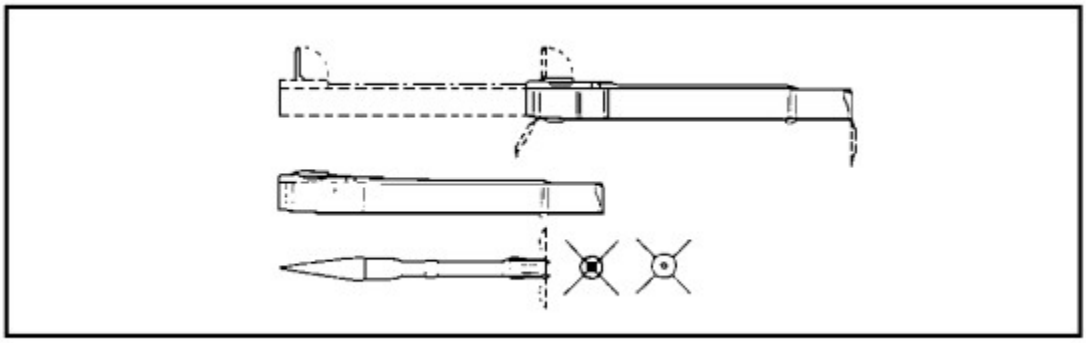

Figure 2-3. AT Rocket Launcher RPG-18.

(1) Description/Capabilities. The RPG-18 is a short-range, tube-launched, disposable infantry antitank rocket weapon system. It is somewhat similar to the U.S. light antitank weapon (LAW) system. The lightweight tube presumably consists of fiberglass-reinforced plastic. The operator carries the launcher in the collapsed position and extends the inner tube to make the weapon ready to fire. It fires a 64-mm rocket (PG-18) with an effective range of 200 meters and a HEAT warhead capable of penetrating up to 375 mm of armor. The fuze of the HEAT grenade activates two to 15 meters after leaving the muzzle and self-destructs after a flight time of four to six seconds. The trigger, safety catch, and rear peep sight are roughly in the middle of the extended tube, or at the rear end of the collapsed tube. The folding sight at the forward end of the tube is calibrated for ranges of 50, 100, 150, and 200 meters.

The RPG-18 is probably a squad-level weapon. Unlike the RPG-7V/-7D and the RPG-16D, the RPG-18 is not linked to a specific person; that is, to the antitank grenadier provided for in the table of organization and equipment (TOE). All soldiers in the squad train on the weapon. This increases the squad's capabilities to destroy tanks at short ranges.

(2) Limitations. The gunner should not fire the RPG-18 if friendly personnel are within a 90-degree sector within 30 meters behind the launcher. It also should not be fired if there are obstacles nearer than two meters in front of the muzzle, or if the height of the line of fire is less than 20 centimeters. Once the tube has been extended it cannot be shoved back together again.

(3) Remarks. The Soviets introduced the RPG-18 in the mid-1970s. It is widely distributed throughout the Soviet Army, including the airborne forces. For employment in airborne units, the RPG-18 comes with a cover which protects it during parachute jumps.

b. AT Rocket Launcher RPG-22. The following paragraphs discuss the RPG-22 Rocket Launcher.

Soviet troops in Afghanistan used the disposable light antitank weapon (LAW) designated RPG-22. Although primarily an antitank weapon, the RPG-22 was

used in Afghanistan against mujahideen strongholds.

(1) Description/Capabilities. Like the RPG-18, the newer RPG-22 is a short-range, tube-launched, disposable infantry antitank rocket weapon system, similar to the U.S. LAW system. The lightweight, collapsible launch tube consists of two parts:

- An outer tube made of fiberglass.
- A sliding inner tube made of aluminum.

The RPG-22 consists of a telescopic outer tube that is 850 millimeters long when extended for use. Simple pop-up sights are graduated for 50, 150, and 250 meters, and there is a temperature-compensating rear sight.

The aluminum inner tube extends 10 centimeters to the front of the outer tube in the firing position. It fires a 73-mm fin-stabilized rocket fitted with a chemical energy high explosive antitank warhead designed to penetrate 480 millimeters of armor at 90 degrees. However, the warhead has a much inferior capability against composite Chobham-type and reactive armor. The rocket has an effective range of 250 meters and a HEAT warhead capable of penetrating approximately 390 millimeters of armor.

The trigger and the pop-up rear peep sight are in the middle of the extended tube. The pop-up front sight is at the forward end of the outer tube. The front sight is calibrated for ranges of 50, 150, and 250 meters.

(2) Limitations. Instructions printed on the side of the RPG-22 launch tube indicate the back-blast covers an 90-degree sector out to 30 meters behind the weapon; that it should not be fired if a wall is closer than two meters behind it; and that the line of fire should be at least 20 centimeters above the ground.

(3) Remarks. The Soviets introduced the RPG-22 in 1985. In time, it will probably replace the RPG-18. As with the RPG-18, it has no dedicated grenadier; all soldiers train to fire the squad-level, throwaway weapon.

PART B - ANTITANK GUNS

Soviet antitank guns are

- SPG-9.
- MT-12.

These guns are described in the following paragraphs.

1. 73-mm Recoilless Gun SPG-9.

The following paragraphs discuss the SPG-s Recoilless Rifle (shown in Figure 2-4).

a. Description. The SPG-9 is a tripod-mounted, recoilless antitank gun firing a 73-mm fin-stabilized, rocket-assisted HEAT projectile. The launcher is 2,110 millimeters long and weighs 47.5 kilograms (59.5 kilograms with the tripod). The

projectile weighs 3.5 kilograms. Its great length is due to the propellant case attached behind the fins. The SPG-9 is also capable of firing a four-kilogram rocket-assisted HE round.

b. Capabilities. The SPG-9 is man portable, but a truck or armored personnel carrier (APC) usually carries the weapon. It must be dismounted and placed on its tripod for firing. It is normally served by a crew of three. Both infrared (IR) and passive night sights are available. The rocket-assisted HEAT projectile has an effective range of 1,000 meters and can penetrate 400 millimeters of armor. It has a high muzzle velocity (435 meters per second) which is increased to 700 meters per second by rocket assist. The SPG-9 is organic to the antitank platoon of the BTR-equipped motorized rifle battalion (MRB). The Soviets usually employ it with mutually supporting antitank guided missiles (ATGMs).

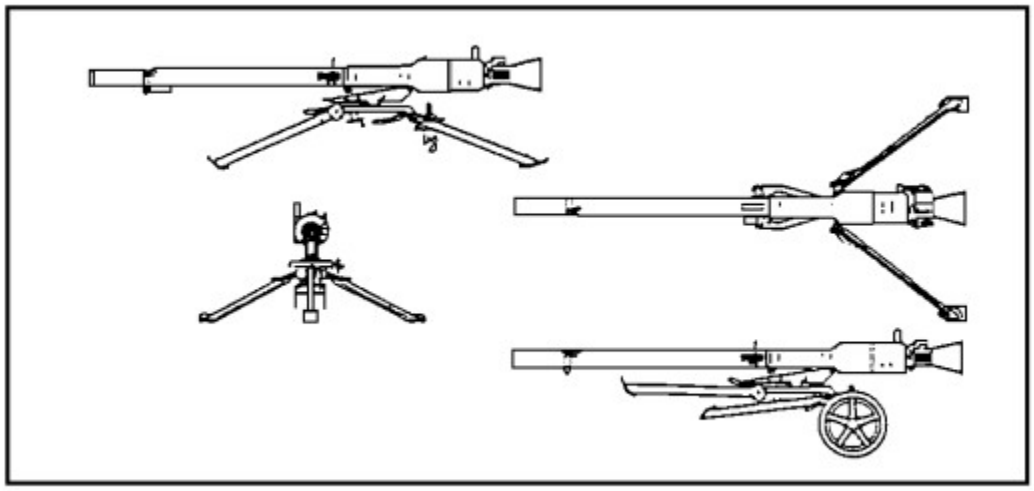

Figure 2-4. 73-mm Recoilless Antitank Gun SPG-9.

c. Remarks. The SPG-9 began replacing the previous recoilless AT guns (82-mm B-10 and 107-mm B-11) around 1970. It is now in service, not only in Soviet MRBs, but also in the Polish, Bulgarian, East German, and Hungarian armies.

2. 100-mm Antitank Gun MT-12.

The following paragraphs discuss the MT-12 Antitank Gun (shown in Figure 2-5).

a. Description. The T-12 is a 100-mm smoothbore AT gun mounted on a two-wheeled, split-trail carriage, with a single caster wheel near the trail ends. The long (8,484-mm) gun tube has a cylindrical, multi-perforated muzzle brake which is only fractionally larger in diameter than the thin barrel. The T-12 variant has a winged shield angled to the rear on both sides and an additional recoil cylinder above the breech on the right. Both versions frequently mount infrared night-sighting equipment.

b. Capabilities. The MT-12 is organic to the antitank battalion at division, army, and front levels. It fires fin-stabilized, non-rotating rounds similar to those of the 115-mm gun of the T-62 tank. Muzzle velocity is 900 meters per second (mps) for

HE and HEAT rounds and 1,500 mps for hyper-velocity, armor-piercing, fin-stabilized discarding Sabot round (HVAPFSDS) rounds. Maximum indirect-fire range is 8,200 meters for Frag-HE ammunition. The effective direct-fire range is approximately 1,000 meters (HEAT) or 2,000 meters (HVAPFSDS). Grazing range against a two-meter-high target is 1,880 meters with the HVAPFSDS round.

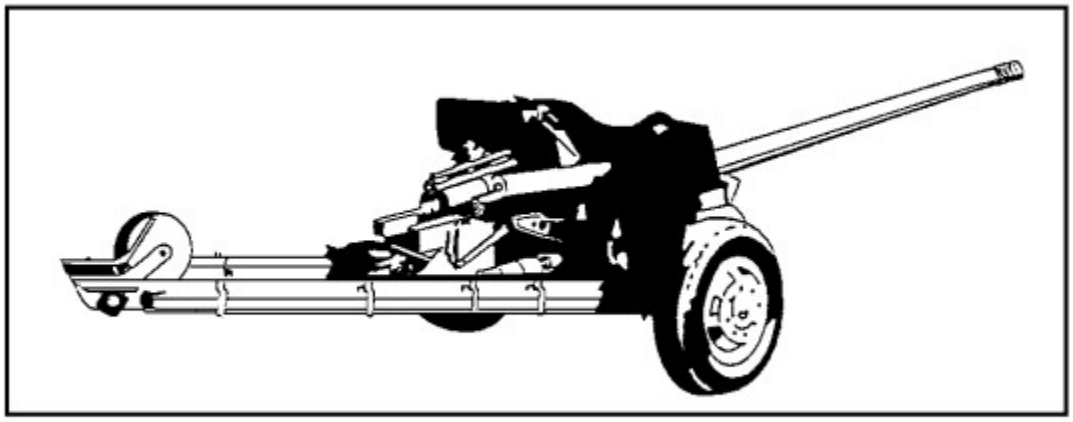

Figure 2-5. 100-mm Antitank Gun MT-12.

The HEAT round can penetrate about 400 millimeters of armor at any range; the HVAPFSDS round can penetrate about 225 millimeters of armor at 1,000 meters. The theoretical rate of fire is reportedly 14 rounds per minute; however, the rate for aimed fire is only six rounds per minute and the maximum practical rate of fire is 10 rounds per minute.

c. Limitations. The T-12 and the MT-12 can function as a field gun only under limited circumstances; this is due to the limited elevation capability, only +20 degrees. However, with trails dug in to provide 45-degree elevation, maximum range is extended to 16,000 to 21,000 meters.

d. Remarks. Since its introduction in about 1965, the MT-12 has replaced the older 100-mm field gun M1944 and the 85-mm antitank gun D-48 in most Soviet front-line units. The MT-12 variant was formerly called the T-12A. Like their predecessors, both can be towed by a truck or armored tracked artillery tractor. The MT-LB multipurpose armored tracked artillery tractor/APC usually tows them. They are in service in at least the Soviet and East German armies. In 1989, the Soviets began to introduce the MT-12 into motorized rifle regiments (MRRs).

PART C - ANTITANK GUIDED MISSILES

1. Antitank Guided Missiles.

These are the guided missiles in the Soviet arsenal:

- AT-2/SWATTER.

- AT-3/SAGGER.
- AT-4/SPIGOT.
- AT-5 SPANDREL.
- AT-6SPIRAL.
- AT-7/SAXHORN.
- AT-8/SONGSTER.

The following paragraphs discuss each of these guided missiles.

a. Antitank Guided Missile AT-2/SWATTER. The following paragraphs discuss the AT-2 SWATTER Guided Missile (shown in Figure 2-6).

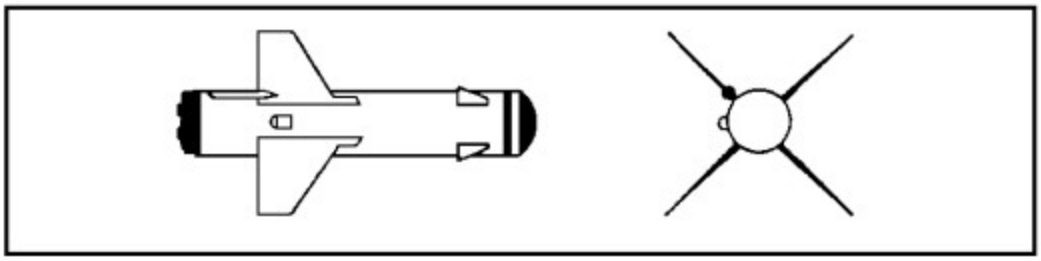

Figure 2-6. AT Guided Missile AT-2/SWATTER.

(1) Description. The SWATTER is a radio-guided antitank guided missile (ATGM) with a HEAT warhead. The missile exists in three versions designated A, B, and C. All versions are 1,160 millimeters long, and 148 millimeters in diameter. The A and B versions differ in weight (27 and 29 kilograms respectively). They both use manual command-to-line-of-sight guidance. However, the AT-2C/SWATTER has semi-automatic command-to-line-of-sight (SACLOS) guidance.

The SWATTER is mounted on BRDM/BRDM-2 scout cars with four launch rails on a traversable mount. When the launcher is raised for firing, armor plates on the BRDM move to the sides, while the launcher on the BRDM-2 attaches to the underside of a flat, retractable, armored cover.

The Mi-8T HIP E can mount two SWATTERs above each of its two external weapons racks. The Mi-24/HIND A and D mount two SWATTERs on wingtip launch rails on each of their two stub wings.

(2) Capabilities. The SWATTER A can engage targets at ranges between 500 and 2,500 meters. SWATTER B and C have maximum ranges of 3,500 and 4,000 meters respectively. All versions have a flight speed of 150 meters per second, resulting in the following flight times to maximum ranges:

- SWATTER A - 17 seconds to 2,500 meters.
- SWATTER B - 23 seconds to 3,500 meters.

- SWATTER C - 26-27 seconds to 4,000 meters.

Armor penetration capability is over 500 millimeters, and the probability of a first-round hit is 67 percent for the SWATTER A and B and over 90 percent for the SWATTER C.

The antitank batteries of the MRRs sometimes use the BRDM/BRDM-2 SWATTERs, although this role is more likely filled by the AT-3 or AT-5. However, SWATTERs, especially the AT-2c updated version, are still in wide use as helicopter-mounted missiles.

(3) Limitations. The SWATTERs with manual command-to-line-of-sight (MCLOS) guidance have a major disadvantage: the operator must track target and missile simultaneously and guide the missile to the target. The slow flight speed makes evasive action (by the target) an effective countermeasure, especially at long ranges.

(4) Remarks. The Soviets introduced SWATTER A in 1960, SWATTER B in 1965, and SWATTER C in 1968-70. The AT-5 SPANDREL is currently replacing the MCLOS-guided BRDM-mounted SWATTERs. The helicopter-mounted SWATTER C, retrofitted with a semi-automatic IR/radio guidance system, was apparently an interim measure pending full deployment of the longer-range, second-generation missile AT-6/SPIRAL.

b. Antitank Guided Missile AT-3/SAGGER (Figure 2-7). The following paragraphs discuss the AT-3/SAGGER Guided Missile.

(1) Description. The SAGGER is a wire-guided ATGM with a HEAT warhead. The missile is 864 millimeters in length, 120 millimeters in diameter, and 11.3 kilograms in weight. It has several launch configurations:

- Manpack.
- Armored Vehicle.
- Helicopter.

With the manpack version, the operator carries the SAGGER in a fiberglass "suitcase." He attaches it by a hinged support to the lid of the case. From that position, he launches the missile by means of a firing button on the control box (not shown). He then uses the control box's periscope sight and control stick to guide the missile to its target.

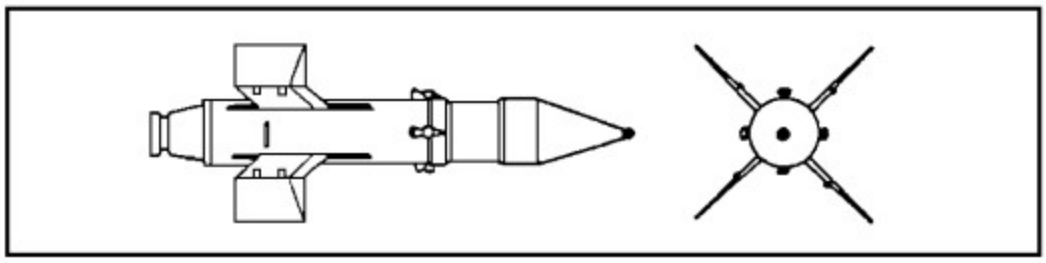

Figure 2-7. Antitank Guided Missile AT-3/SAGGER.

On BRDM/BRDM-2 scout vehicles, six launch rails are mounted on the underside of a retractable armored cover, with eight additional missiles carried inside the vehicle. The BMP-1 and BMD-1 combat vehicles both have a single launch rail mounted above the 73-mm main gun and carry a total of four and three missiles respectively.

The Mi-2/HOPLITE helicopter can carry two SAGGERs on each side of its cabin. The Mi-8TB/HIP F carries six SAGGERs.

(2) Capabilities. The SAGGER can engage targets at ranges of 500 to 3,000 meters and penetrate over 400 millimeters of armor. It employs a MCLOS guidance system in which the operator must observe both missile and target and guide the missile to the target. This wire-guided missile is invulnerable to electronic countermeasures (ECM) and has a very small percentage of malfunctions.

The retractable launcher on the BRDM-2 vehicle has the ability to traverse 70 degrees to the left or right with elevation varying from -3.5 to +17 degrees.

The AT-3/SAGGER C variant employs SACLOS guidance. It is mounted primarily on the BRDM-2, but it may also be mounted on the HIP F and HOPLITE helicopters. These heliborne systems provide greater flexibility to the ground command but at a greater risk and vulnerability cost to the launch platform.

The antitank platoon of a BTR-equipped MRB has two ATGM squads, each with two manpack SAGGER firing teams. Each three-man team has a control box, four SAGGER missiles, and a RPG-7V AT grenade launcher.

The gunner carries two missiles and the control box in suitcases. The assistant gunner carries two more missiles in suitcases. The backup gunner mans the RPG-7V.

The team can set up, check out, and fire one missile in five minutes or all four missiles in 12 to 15 minutes. Using a four-position selector switch on the control box, the gunner can fire up to four missiles consecutively. He can remotely fire missiles from positions up to 15 meters from the launchers.

For targets at ranges less than 1,000 meters, the gunner can guide the

missile by eye; for longer ranges he must use the eight-power magnifying periscope sight. The RPG-7V gunner is usually deployed 150 to 200 meters in front of the SAGGER position to cover targets inside the SAGGER's minimum range of 500 meters. The antitank platoon also has two SPG-9s which may be deployed with the manpack SAGGERs.

BRDM/BRDM-2 SAGGERs are organic to the antitank missile battery of motorized rifle regiments (MRRs) and airborne regiments; to the antitank battalion of motorized rifle divisions (MRDs); to the antitank regiment of combined arms armies (CAAs); and to the antitank brigade of artillery divisions.

The BRDM/BRDM-2 vehicles have a reaction time of only one minute to fire from a completely buttoned-up mode. The crew can fire six missiles without reloading, and the vehicle can carry eight additional missiles inside. Successive missiles can be fired and tracked within five seconds of the previous missile's impact. The gunner can operate either from within the vehicle or from a remote position up to 80 meters away. The vehicle has a two-man crew which includes the commander/gunner and the driver. They also have assault rifles and a RPG-7V antitank grenade launcher.

(3) Limitations. A SAGGER A gunner must visually track both target and missile simultaneously; this requires extensive training and constant practice. Although the missile leaves the launcher armed and can detonate and kill at very short range, it can be captured by the gunner only at ranges of 500 to 800 meters. Under combat conditions however, most gunners can successfully engage targets only between 1,000 and 3,000 meters. The missile has a very long flight time to the target:

- 12.5 seconds to 1,500 meters.
- 25 seconds to 3,000 meters.

Evasive action is effective against the SAGGER, especially at long ranges. Although the SAGGER produces a cloud of gray smoke and a loud roar when fired, its signature is difficult to detect on the battlefield.

(4) Remarks. The SAGGER, also known by the designation AT-3, was first seen in 1961. It is more compact than the earlier AT-1/SNAPPER and AT-2/Swatter ATGMs, but carries an equally powerful warhead. In recent years, the Soviets have retrofitted some SAGGER systems, designated the AT-3c, with semi-automatic IR wire-guidance systems. Only the vehicle- and helicopter-mounted missiles have been so retrofitted. This is obviously an interim measure pending the full deployment of the longer-range, second-generation AT-5/SPANDREL and AT-6/SPIRAL missiles. The AT-4/SPIGOT is replacing manpack SAGGERS as well as those mounted on the BMP-1 and BMD-1.

c. Antitank Guided Missile System AT-4/SPIGOT. The following paragraphs discuss the AT-4/SPIGOT Guided Missile System (shown in Figure 2-8).

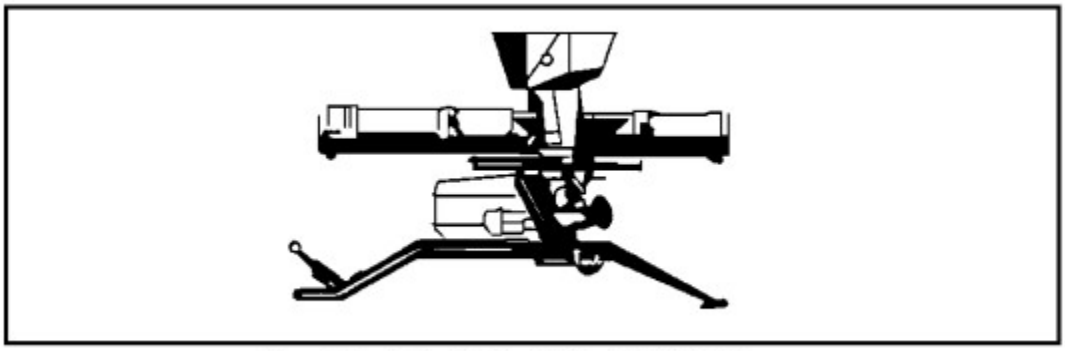

Figure 2-8. Antitank Guided Missile AT-3/SPIGOT.

(1) Description. The AT-4/SPIGOT is a tube-launched, wire-guided, (SACLOS), ATGM system, similar in many respects to the U.S. TOW (tube-launched, optically tracked, wire-guided) system. The AT-4 system consists of three major components:

- The SPIGOT missile.
- The launch tube.
- The missile launcher.

The missile itself is 863 millimeters long and 119 millimeters in diameter; it weighs 7.4 kilograms and has a HEAT warhead. The launch tube is 1,100 millimeters long, 130 millimeters in diameter, and 5.2 kilograms in weight. It serves to store and carry the missile. The tripod-mounted launcher for ground-launched employment has a periscope sight attached to its left side. The sight and missile tracker comprise a single unit, which is mechanically attached to the launch-tube connecting rail so both move together in elevation. A locking lever allows the complete periscope sight and missile tracker to be released and rotated into a folded position for transport. The monocular optical sight has four-power magnification and a 4.5-degree field of view.

The crew loads the SPIGOT missile by sliding the tube onto the launch supports from the rear until the electrical contacts and a mechanical catch engage; then the system is ready for launch. The Soviets originally designed the AT-4/SPIGOT as a ground-launched weapon system. However, the turrets of the BMP-1 and BMD-1 combat vehicles can mount the AT-4 launcher. The BRDM-2 launcher vehicle of the AT-5 system and the launcher on the BMP-2 can also fire the SPIGOT missile.

(2) Capabilities. The SPIGOT has a minimum range of only 70 meters and a maximum range of 2,000 meters. Missile speed is estimated at 185 meters per second, which gives the missile a flight time of 11 seconds to its maximum range. The warhead, which is probably smaller than the SAGGER's, can penetrate 500 to 600 millimeters of armor. Probability of a first-round hit should be at least that of the semi-automatic AT-3c/SAGGER, which is 90 percent.

The SACLOS guidance system increases accuracy and reduces operator training requirements since it is no longer necessary for the operator to keep track of both target and missile simultaneously. The gunner merely keeps his sight on the target while the missile is tracked automatically. The deviation between the missile's path and the operator's line of sight is measured by an IR tracking apparatus. (The IR source is in the missile's tail.) A device at the control site then generates guidance commands which are transmitted to the missile by the wire link, causing the missile to eliminate the deviation.

The AT-4 tracker is adequate, simple, and inexpensive. Its extremely narrow field of view makes it more difficult to decoy, since the decoy source must be inside the field of view.

The antitank platoon of the BTR-equipped MRB has four (or in high readiness units, six) AT-4/SPIGOT firing teams. In each three-man team, the gunner carries the folded launcher and tripod as a backpack, the two bearers each carry two launch tubes as backpacks. All three men carry their assault rifles. The team is not equipped with a RPG-7V since the SPIGOT does not have the 500-meter dead space of the SAGGER.

(3) Limitations. Since the SPIGOT launcher must stay with the aiming and tracking assembly, i.e., the gunner, it is not possible to move him to a remote location for safety. And since the gunner must establish and maintain visual contact with the target, any means of disrupting his concentration is an effective countermeasure. Such means include flash blinding, suppressive fires, and smoke screening. Besides being effective and inexpensive, smoke also attenuates the IR guidance link with the missile tracker.

(4) Remarks. The AT-4/SPIGOT system, given the nickname "Fagot" (In Russian "Fagot" means "Bassoon") by the Soviets, was introduced in 1974. It is operational in all Warsaw Pact countries. The interoperability of the SPIGOT missile on the AT-5 launch vehicle and BMP-2 provides a significant logistic and tactical advantage, however, use of the SPANDREL missile on the AT-4 portable launcher has not been confirmed.

d. Antitank Guided Missile AT-5/SPANDREL. The following paragraphs discuss the AT-5/SPANDREL Guided Missile (shown in Figure 2-9).

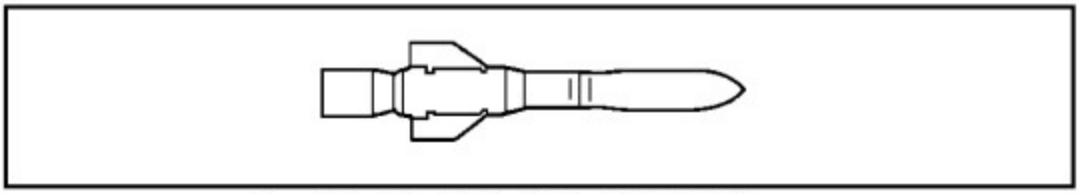

Figure 2-9. Antitank Guided Missile AT-5/SPANDREL.

(1) Description. The AT-5/SPANDREL is a wire-guided SACLOS, ATGM system mounted on the BRDM-2 amphibious scout vehicle

chassis. Dimensions and shape of the launch tube are similar to those of the AT-4/SPIGOT, but the SPANDREL missile is considerably heavier. The SPANDREL launch tube has a blow-out cap at the front, and it is flared at the rear. Five SPANDREL missiles, or any combination of SPIGOT and SPANDREL missiles, are carried on a traversable mount just behind the two front cupolas of the BRDM-2. A bowed hatch in the vehicle roof immediately behind the launcher allows the launcher to be folded backwards into the hull for reloading under armor protection. The vehicle carries an additional 10 reload missiles inside. A rotatable, optical, sighting/tracking periscope, similar in appearance to the periscope on the AT-4/SPIGOT launch apparatus, is mounted atop the gunner's hatch on the right front of the vehicle roof. A single AT-4 launch platform with an integrated optics/tracker housing is mounted atop the turret of the BMP-2 amphibious combat vehicle. As with the BRDM-2 launch pedestal configuration, this variant of the AT-5 system can launch either the SPIGOT or the SPANDREL missile. The basic on-board load for the BMP-2 is four missiles.

(2) Capabilities. The SPANDREL has a range of 4,000 meters. Other capabilities are essentially the same as those listed above for the AT-4/SPIGOT, except for time of flight.

(3) Limitations. The limitations of the AT-5/SPANDREL system are precisely those of the AT-4/SPIGOT, namely the requirement for the gunner to keep visual contact and concentration on the target. He can be distracted by fires or smoke screening; the latter can also disrupt the IR link.

(4) Remarks. The Soviets nicknamed the AT-5/SPANDREL system "Konkurs" or "contest." They introduced it around 1974 or 1975, although it was not displayed for public viewing until the Red Square Parade of 1977. The BRDM-2-mounted AT-5 system will eventually replace all vehicle-mounted AT-2 and AT-3 systems in the Soviet Army. The AT-5/SPANDREL system is currently operational in the Warsaw Pact countries.

e. Antitank Guided Missile AT-6/SPIRAL. The AT-6/SPIRAL Guided Missile (shown in Figure 2-10) is discussed in the following paragraphs.

(1) Description. The AT-6/SPIRAL is a tube-launched, SACLOS, ATGM mounted on the Mi-24/HIND E and F helicopters. It replaces the heliborne AT-2/SWATTER variants found on previous HIND models. Normally, there are I-shaped launch fixtures for two SPIRAL launch tubes on each wingtip of the HIND E and F. However, the HIND E and F may carry a second AT-6 launch platform on the outboard universal pylon on each wing. This allows them to mount a total of eight SPIRAL missiles. Also, some HIND E and F models have "stacked" AT-6 launch platforms on the wingtip pylons for a possible total of 16 SPIRALs. Unlike the AT-4/SPIGOT and AT-5/SPANDREL, this missile system is not wire guided.

The SPIRAL uses a SACLOS system with IR missile tracking and radio guidance which is similar to the uprated AT-2c/SWATTER C system. Also, it is much larger than previous Soviet ATGMs.

(2) Capabilities. The SPIRAL's maximum range is estimated to be 5,000 meters. Its minimum range may be similar to the earlier AT-2/SWATTER ATGMs; that is, 600 meters. Missile speed is probably about 450 meters per second. The warhead could weigh up to 10 kilograms with an armor penetration capability of 600 to 700 millimeters. First-shot-hit probability should be as good as the AT-2c -- 90 percent. The SACLOS guidance system probably operates the same as the AT-4/SPIGOT and AT-5/SPANDREL, except that the SPIRAL is not wire-guided.

(3) Limitations. During the flight time of the SPIRAL to the target (estimated to be about 11 seconds to 5,000 meters) the target can take evasive action but the helicopter launch platform has only a limited ability to take evasive action itself since the gunner must keep the target in his sight. This, of course, renders the helicopter vulnerable.

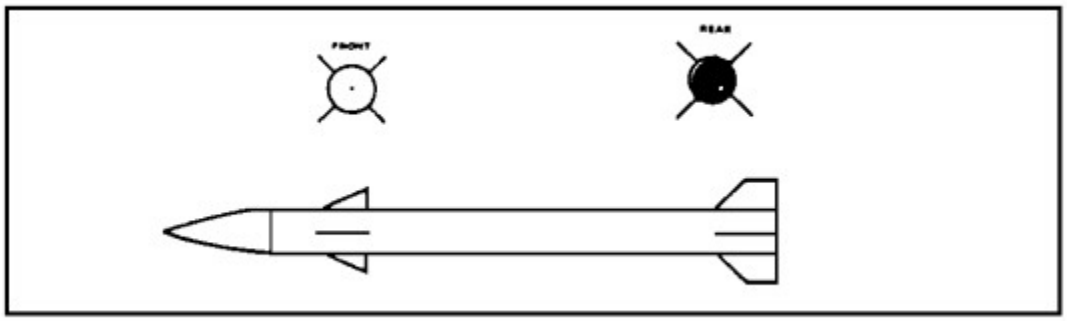

Figure 2-10. Antitank Guided Missile AT-5/SPIRAL.

(4) Remarks. Although introduced in 1973, the AT-6/SPIRAL system was not seen by Western observers until 1978 when it was spotted on a HIND E. Some sources credit the SPIRAL with a maximum range of 7,000 meters.

f. Antitank Guided Missile AT-7 SAXHORN. The following paragraphs discuss the AT-7 SAXHORN Guided Missile (shown in Figure 2-11).

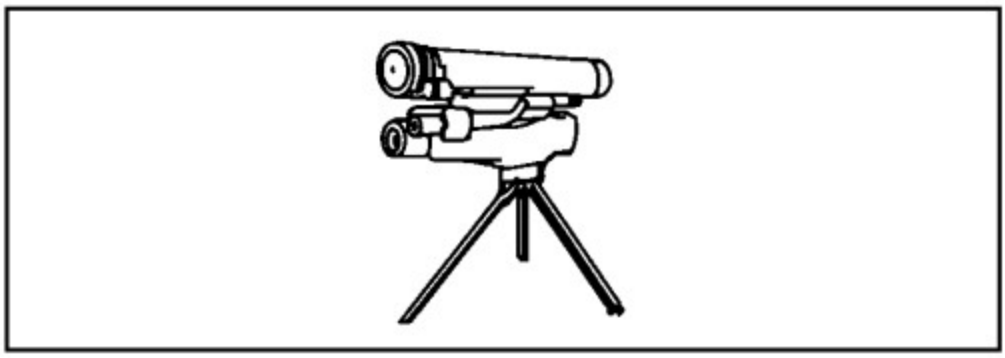

Figure 2-11. Antitank Guided Missile AT-7/SAXHORN.

(1) Description. The AT-7/SAXHORN is a tube-launched, SACLOS, ATGM system with a wire command link. One man can carry and operate the SAXHORN, but the crew normally will consist of two men. The second man probably carries additional missile canisters.

(2) Capabilities. The AT-7/SAXHORN is organic to the machine gun/antitank platoon of the BTR-equipped motorized rifle company (MRC). This platoon has three manpack launchers. The SAXHORN missile, with its HEAT warhead, has a maximum range of 1,000 meters. The operator tracks the target visually using a monocular scope. The missile is guided automatically to the target when the gunner keeps the crosshairs of his sight on the target.

(3) Limitations. Limitations of the AT-7/SAXHORN ATGM system are identical to those of the AT-4/SPIGOT system, namely the requirement for the gunner to keep visual contact and concentration on the target. He can be distracted by fires or smoke screening; the latter can also disrupt the IR link.

(4) Remarks. The AT-7/SAXHORN is generally considered to be in the same category as the U. S. Dragon missile. The AT-7/SAXHORN system was introduced in 1979 and is believed to have been placed on general issue in the early 1980s, but so far little information has appeared in the West.

The weapon appears to be the usual type of prepacked launch tube with the missile mounted upon a firing post with optical and electro-optical sights. The method of guidance is not known, although it is possibly a laser beam rider. The missile is believed to weigh about six kilograms and has a shaped charge warhead capable of defeating more than 500 millimeters of armor. The maximum range is probably 1,500 meters.

g. Antitank Guided Missile AT-8/SONGSTER. The AT-8/SONGSTER (shown in Figure 2-12) is discussed in the following paragraphs. The identification in the Soviet arsenal of an innovative (or even simply unconventional) weapon system with no direct counterpart in Western practice is almost certainly bound to spark

discussions and doubts as to its nature and purpose--if not about its very existence. Sometimes, there is concrete evidence immediately available to show that the system is no less real simply because Western planners and engineers have never concocted anything similar, and its reason for being is self-evident, as in the case of the VASILYEK automatic mortar and the PLAYMA grenade launcher. However, sometimes things are a little bit more difficult. There are many past examples, but, as of today, the single most difficult puzzle is perhaps the AT-8 cannon-launched missile, previously designated KOBRA (this could be the Soviet name, but there is no certainty) and which has now received the name SONGSTER.

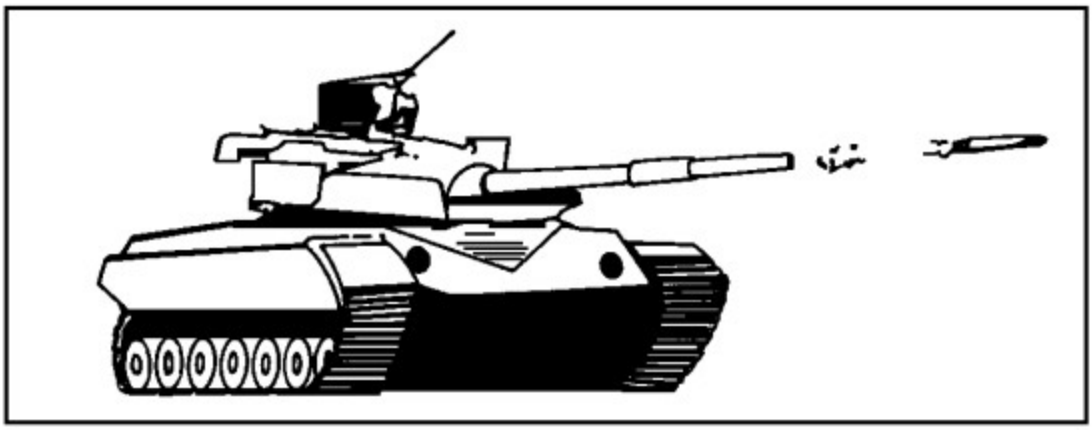

Figure 2-12. Antitank Guided Missile AT-8/SONGSTER.

The first hints in the press were put forward in November 1984 by the U. S. Army Scientific Bulletin. The weapon was subsequently mentioned in the 1985 edition of the Pentagon booklet," Soviet Military Power." Since then, its existence has been taken for granted by most Western defense commentators strictly on the basis of the little information circulated by the Western defense intelligence community because, to our knowledge, no concrete evidence ever filtered outside strictly guarded circles (assuming that concrete evidence is indeed available somewhere).

(1) Description. The AT-8/SONGSTER is launched from the muzzle of a tank's main gun rather than a launch tube or rail. The ATGM has SACLOS guidance with a radio-frequency command link. It is known to be fired by T-64B and T-80 medium tanks.

(2) Capabilities. The SONGSTER missile has a maximum range of 4,000 meters. Its HEAT warhead has an impressive armor penetration capability of 700 to 800 millimeters. The missile is fired through the main-gun tube like a normal tank round; after launch however, it uses a sustain or boost/sustain motor to propel it to the target. The tank gunner tracks the target visually using a monocular periscope; the missile is guided automatically as long as the gunner keeps the crosshairs on the target.

(3) Limitations. SONGSTER missile limitations are the same as for other

SACLOS-guided system missiles except the gunner is less vulnerable to suppressive fires.

(4) Remarks. The AT-8/SONGSTER may have entered service with Soviet troops around 1981.

The exact nature and characteristics of SONGSTER are extremely difficult to visualize from both the operational and technical point of view. The assumption that a weapon such as the AT-8 does exist implies formidable conceptual and logical problems. The evidence available about the AT-8 (whatever its nature) is interpreted by Western intelligence agencies and defense commentators as follows:

- The AT-8 SONGSTER (KOBRA) is a guided missile intended to be launched from the 125-mm smooth-bore gun of the T-64B and T-80 MBTs, which are equipped with a modified version of the RAPIRA 3 125-mm gun standard on the T-64A/T-72 series. The missile is credited with a maximum speed of 1,500 meters per second and a range of about 5,000 meters. It is assumed that it is "fired" at low speed (150 meters per second) by a small charge, the main cruise motor igniting at a safe distance from the muzzle.
- There is considerable uncertainty regarding the guidance principle used. The AT-8 has been described so far as a laser-guided missile (either a beam-rider or a semi-active homer). The armored box placed in front of the commander's cupola on the T-64B and T-80 MBTs (and in all likelihood associated with the SONGSTER) was referred to as a "laser sight." However, new evidence (to which, again, we have no direct access) indicates that the box is not an optic or optronic device. In fact, it has no openings or ports.
- Originally, the SONGSTER was referred to as a long-range antitank weapon. This interpretation implies a whole series of major technological/operational inconsistencies. However, the Western defense intelligence has since changed its mind concerning the nature of the SONGSTER. The AT-8 is now considered to be mainly an anti-helicopter weapon, intended to ensure the self-defense of MBTs against Western combat helicopters carrying antitank missiles; antitank engagements cover only a secondary role. Additionally, several considerations suggest that the main ground targets are likely to be not MBTs but, rather, missile tank destroyers.

Seen in this perspective, the AT-8 does make some operational sense. However, three points still remain difficult to explain:

- The physical compatibility of the weapon with the tanks that are supposed to carry it.
- The operational implications.

- The guidance principle.

PART D - SOVIET TANKS IN THIRD WORLD NATIONS

1. T-72 Medium Tank.

The T-72 and its variants have greater mobility, better armor protection, and better firepower than the T-62. It has the same integral engine smoke-generating system as the earlier T-54/55/62, and it has smoke grenade launchers. The T-72 is used by the Soviet Union and its following allied countries:

- Poland.
- Czechoslovakia.
- Yugoslavia.
- India.

The following Third World countries also have the T-72 tank:

Country	Quantity	Comments
Algeria	300+	
India	650	Local production
Iraq	350-560	Includes Yugo T-84
Kuwait	200	Yugoslavian T-84 + UK
Libya	180	
Syria	1,100	

2. T-54/55 Modernized Tanks.

The Soviet Union and other countries, including China, Egypt, Romania, Czechoslovakia, Hungary, and Poland, have begun programs to modernize some T-54/55 tanks or the Chinese version, Type 59.

Improvements include new APFSDS ammunition. This ammunition has a muzzle velocity of 1,500 meters per second and armor penetration of 300 millimeters of RHA.

Other improvements include:

- A new computerized fire-control system to improve first-round-hit probability.
- Strap-on laser rangefinders.
- Add-on armor.
- Smoke grenade launchers.
- Track skirts.

- Upgraded mobility components (track and engine).

Czech T-55 improvements include:

- A crosswind sensor.
- Thermal guntube sleeve.
- Laser warning device that warns the crew when the vehicle is being lased.

The following Third World countries have the T-54/55 or Type 59 tanks:

Country	Quantity	Comments
Afghanistan	300-400	
Algeria	390	
Angola	300	
Bangladesh	70-100	
China	6,000	Type 59
Congo	35	Plus 15 Type 59
Cuba	650	
Egypt	1,040	Some with 105mm guns
Ethiopia	600	
India	800-950	
Iran	1,000	Plus 260-400 Type 59
Iraq	700	Plus some Type 59
Israel	300	Some with 105mm guns
Kampuchea	60	Some Type 59
Lebanon	50	
Libya	1,700	
Mongolia	100+	
Mozambique	150	
Nicaragua	130	
Nigeria	70	

North Korea	2,000	Includes 175 Type 59
Pakistan	1,151	Includes 1,100 Type 59
Peru	300	
Somalia	100	
Sudan	150	
Syria	2,100	
Vietnam	1,000-1,500	Plus 160 Type 59
Yemen, North	580	
Yemen, South	200	

3. T-62 Modernized Tank.

Soviet T-62 tanks used in Afghanistan had a number of modifications, including the following ones:

- Full-length track skirts.
- Curved, horseshoe shaped add-on armor sections mounted on the upper glacis.

The add-on turret armor provides additional protection against shaped charge antitank munitions.

These tanks carry a strap-on laser rangefinder mounted above the main gun. They also have smoke grenade projectors on the sides of the turret.

The following Third World countries have the T-62 tank:

Country	Quantity	Comments
Afghanistan	100	
Algeria	300	Local production
Angola	100+	
Cuba	300	
Egypt	500-600	Some with 105mm guns
Ethiopia	100	
Iran	150+	
Iraq	1,600	

Israel	120	
Libya	900-1,300	
Mongolia	100	
North Korea	600+	Plus locally produced
Peru	50	
Syria	1,000	
Vietnam	200	
Yemen, North	34	
Yemen, South	170	

Lesson 3

FUTURE antiarmor WEAPONS STRATEGY

OVERVIEW

Lesson Description:

In this lesson, you will learn to identify the characteristics of the antiarmor weapons strategy of the United States with regard to the Multipurpose Individual Munition (MPIM); the TOW Sight Improvement Program (TSIP) and the development of the TOW 2B. In addition, you will learn to identify the characteristics of opposing forces' future antiarmor weapons strategy with regard to the light-armored vehicles in the Third World.

Terminal Learning Objective:

Action:	Identify future antiarmor weapons strategy of both the United States and its opposing forces.
Condition:	Given the subcourse material contained in this lesson.
Standard:	You will identify the future antiarmor weapons strategy of both the United States and its opposing forces.
References:	The material contained in this lesson was derived from the following publications: COLLECTIVE TRAINING PLANS (DOTD) and OPERATIONAL AND ORGANIZATION

PLANS (DCD).

INTRODUCTION

Future antiarmor weapons strategy on the part of the United States includes improvements to the TOW Weapon System and the introduction of the new Multipurpose Individual Munition (MPIM). The improvements to the TOW Weapon System pertain to the employment of a new missile (the TOW 2B) and improvements which have been made to the TOW sight. Future antiarmor weapons strategy on the part of the Soviet Union and other opposing forces pertain to new light-armored personnel carriers (wheeled and tracked). This lesson will teach you to identify the characteristics of these future antiarmor weapons strategies U. S. and opposing forces.

PART A - FUTURE U.S. antiarmor WEAPONS STRATEGY

1. Development of TOW 2B.

A new missile is being developed for the TOW weapon system. It will be a tandem design which exploits new technology in Explosively Formed Penetrators (EFPs) and evaluating new metals for liners.

The TOW 2B has dual warheads and dual sensors for fly-over, shoot-down (top attack) capability which attacks the most vulnerable part of an armored vehicle. The TOW 2B will replace the TOW 2A via a production line cut-in 1990.

The model number for the TOW 2B missile is BGM 71F.

No further training is required for TOW gunners as a result of fielding the TOW 2B missile, which has a center mass aimpoint.

The TOW 2 missile can be fired from all existing firing platforms.

Currently, the overall TOW 2B program is on schedule for FY91 fielding.

The TOW 2B has a unique marking system (shown in Figure 3-1) for easy identification of it as a fly-over, shoot-down missile.

2. TOW Sight Improvement Program (TSIP).

Technological advancements have resulted in improvements to the TOW sight. These improvements will be applied to both the ground/HMMWV and the Bradley Fighting Vehicle (BFV) systems.

The principal improvements of the TOW Sight Improvement Program (TSIP) are as follows:

- A new Forward Looking Infrared (FLIR) sight.
- A new processor which replaces the Digital Missile Guidance Set (DMGS). The new processor incorporates automatic tracking and multiple launch capability.

- The visual telescope and the shortwave length infrared tracker will be upgraded.
- An eyesafe laser rangefinder.

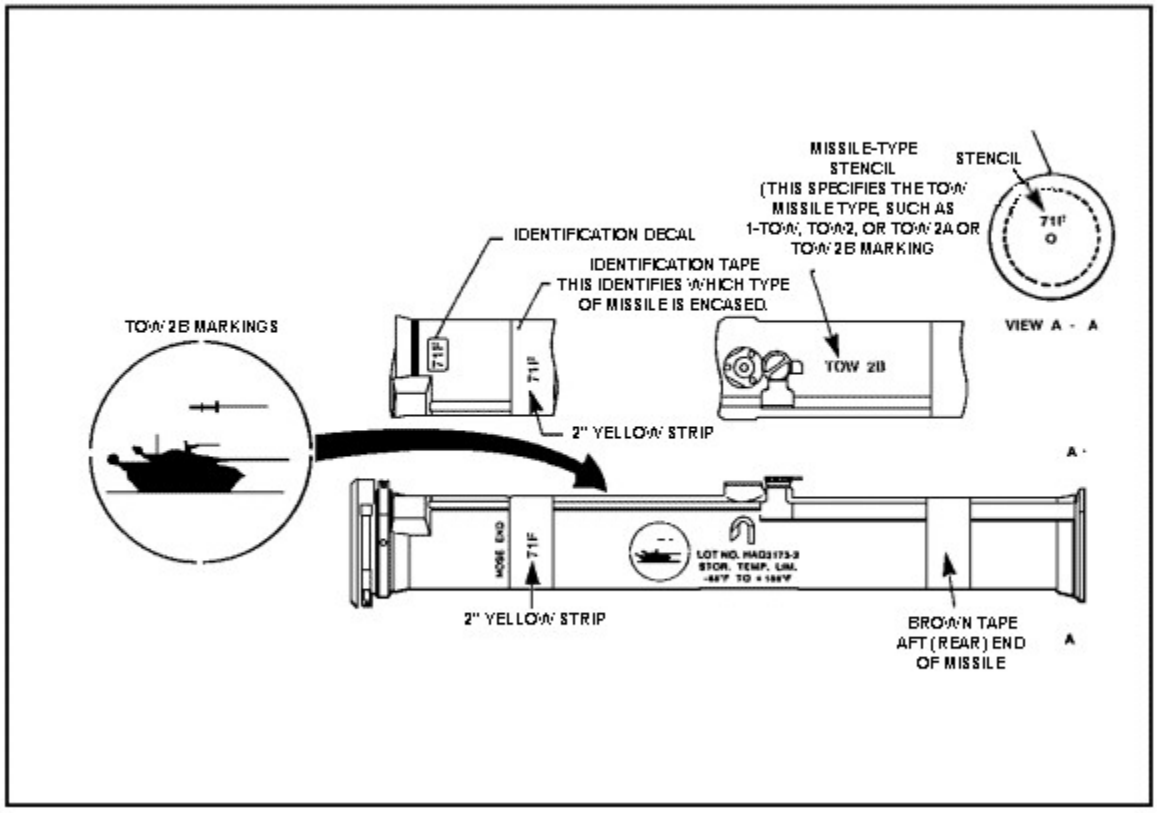

Figure 3-1. Missile Markings for Identification (BGM 71F).

The FLIR technology is being developed by the CECOM Center for Night Vision and Electro-Optics (CCNVEO). The two major CCNVEO technology programs are Standard Advanced Infrared Systems (SAIRS) and Advanced Longwavelength Infrared Circuit and Array Technology (ALICAT). The new processor incorporates automatic tracking and multiple launch capability. This technology is being developed in the Very High Speed Integrated Circuit (VHSIC) program. A portion of the critical technology will be the Kinetic Energy Missile (KEM) program. The new system also includes:

- An eyesafe laser rangefinder.
- Automatic boresight.
- TV display.
- Advanced signal processing MIL-STD-1553 software bus.
- ADA language.
- Automatic target cueing.
- Built-in training.
- Built-in test.
- Room for growth.

a. Ground/HMMWV. The new FLIR and redesigned telescope will be repackaged with the short wavelength Infrared (IR) tracker to make up an Integrated Sight Unit (ISU) for ground/HMMWV application. This will provide improved FLIR performance and single target engagement at increased ranges. Automatic boresight of the telescope, short wavelength IR tracker, and FLIR will be incorporated as well as target cueing (moving target indicator) and simultaneous multiple target engagement. The dismounted mode of employment will use a tripod to support the ISU and a single TOW missile. Batteries will provide power for operation of the system when dismounted. A power cable to use vehicle batteries and power for extended periods of operation at locations for the sight/launcher remote from the vehicle can be provided.

b. BFV (CFV). The Bradley Fighting Vehicle (BFV) ISU contains a visual telescope, a short wavelength IR tracker, a CCD camera, TV display, and a FLIR. The new FLIR and redesigned telescope will be repackaged with the short wavelength IR tracker to make up an ISU for the BFV application. This will provide FLIR performance and target engagement at increased ranges. Auto boresight of the telescope, short wavelength IR tracker and FLIR will be incorporated as well as target cueing (moving target indicator), simultaneous multiple target engagement, and multiple launch.

c. Benefits. The TSIP benefits include:

- Reduced target acquisition time.
- Wider field of view for search.
- Increased probability of a hit.
- Increased system/crew survivability.
- Increased rate of fire.
- Improved man-machine interface.
- Commonality of components between ground/HMMWV and BFV configurations.
- Improved combat effectiveness for the HMMWV and Bradley fighting vehicles due to a longer recognition range, automatic multiple target tracking, multiple missile launch, and improved fire control.
- Embedded training.
- Improved built-in test.
- Automatic boresight.
- Capability of firing all existing and future TOW missiles.
- Modular subsystems for maximum HMMWV and Bradley commonality.
- Retrofitable product improvement program.

3. MultiPurpose Individual Munition (MPIM).

The Multipurpose Individual Munition (MPIM) will enable the soldier to engage and defeat a variety of targets. The system will allow the individual soldier both to destroy light armor and incapacitate personnel within or behind structural barriers or field fortifications. It will be used by soldiers in all geographical areas under any climatic and battlefield conditions. Combat arms, as well as combat support and combat service support units, will use this weapon to accomplish their missions. The weapon will be employed as a round of ammunition and will not require any maintenance other than inspection and cleaning. The MPIM is a multipurpose weapon system that is projected to supplement and eventually replace the Launcher and Cartridge, 84-MM, M136 (AT4), HEAT and the M72A2/A3 Light Antitank Weapon (LAW).

Presently, two technologies are under consideration: a shoulder-launched munition and two rifle-launched munitions.

The MPIM will be a basic self-protection weapon for use against lightly armored vehicles for all Army units. It will be used as an assault weapon for combat arms use against enemy field fortifications and in military operations urban terrain (MOUT) environments. Tactical use is envisioned as being similar to the AT-4/LAW.

The MPIM will allow the individual soldier to engage targets and exploit his own firepower without dependence upon specialized support weapons.

The MPIM will be designed to replace the M72A2/A3 LAW and the AT4 with a single individual weapon/munition capable of defeating multiple types of targets in the close combat scenario.

The MPIM must incapacitate personnel inside or defeat the following multiple targets:

- Boyevaya Machina Pekhotnaya (BMP), BMP follow-on, and BMP postulated.
- 12-inch brick structures.
- Eight-inch concrete structures.
- Soviet field fortifications.

In addition, the MPIM can destroy or damage high-value material such as ammunition storage, POL, and communications.

PART B - FUTURE OPPOSING FORCES antiarmor WEAPONS STRATEGY

1. Wheeled Armored Personnel Carrier.

The most likely light armored vehicles that a US infantryman might encounter in the Third World in the future (1997-2007) is the wheeled armored personnel carrier.

This vehicle will be protected against 7.62-mm or .50 caliber armor piercing (AP) rounds and could have add-on armor that will reduce the effectiveness of 14.5-mm, 20-mm, and 25-mm ammunition. The vehicle will not have reactive armor.

The vehicle will have a night sight, either an image intensifier (II) or an active infrared (IR) system. This vehicle may also have a white light or an infrared searchlight.

The vehicle will be armed with a 7.62-mm coaxial machine gun and either a 12.7-mm (.50 caliber), a 14.5-mm, a 20-mm, a 23-mm, or a 25-mm gun. The vehicle may also have a 30-mm AFS-17 or a 40-mm Mark 19 automatic grenade launcher on it. The vehicle will have smoke grenade launchers. Examples of these vehicles are the

- Soviet BTR-152 (a Chinese copy Type 56).
- Soviet BTR-60 (copies of the BTR-60 are the Czech OT-64, the Romanian TAB-72, and the Polish SKOT-2).
- French Panhard M3.
- USA's Commando.
- West German UR-416.
- British Saracen.
- Brazilian EE-11.

These vehicles will appear on the battlefield in groups of three or four.

The size of the element dismounting will be eight to ten. In this element, there will be an antiarmor gunner with an RPG-7 type weapon and one or two light machine guns. Some of the characteristics of these vehicles are shown in Figure 3-2.

2. Tracked Armored Personnel Carrier.

The next most likely light armored vehicle that a US infantryman might encounter in the Third World in the future (1997-2007) is a tracked armored personnel carrier.

It will be protected against 7.62-mm or .50 caliber armor-piercing (AP) rounds. The vehicle will not have reactive armor.

The vehicle will have a night sight, either an image intensifier (II) or an active infrared (IR) system.

Nomenclature	No. of Countries	Producer(s)	Crew/ Pax	Wheels	Weapons
BTR-152	33	USSR	2/17	6 x 6	12.7mm & 7.62mm or 2 x 14.5mm
BTR-60	29	USSR	2/8-14	8 x 8	14.5mm & 7.62mm
PANHARD M3	24	France	2/10	4 x 4	20mm & 7.62mm or 2 x 20mm
COMMANDO V-100, V-150, and V-300	23	USA	3/9	6 x 6	90mm or 25mm or 12.7mm, & one or two 7.62mm
UR-416	15	West Germany	2/8	4 x 4	20mm & 7.62mm
EE-11 (URUTU)	15+	Brazil	1/12	6 x 6	12.7mm
SARACEN	11	UK	2/10	6 x 6	2 x 7.62mm
OT-64/SKOT	7	Czech/ Poland	2/15	8 x 8,	14.5mm, 7.62mm, & AT-3
VAB	10+	France	2/10	4 x 4	20mm or 12.7mm or 12.7 & 7.62mm
MOWAG PIRANHA	7	Swiss/ Chile	2/8-13	4,6,8	90mm or ATGM or 7.62mm
FIAT 6614	5	Italy	1/10	4 x 4	12.7mm

The vehicle may be armed with a 7.62-mm coaxial machine gun and either a 12.7-mm (50 caliber) or a 14.5-mm machine gun. The vehicle may have smoke grenade launchers. Examples of these vehicles are the

- M113 (produced by the USA, Belgium, Italy, and Pakistan).
- Soviet BTR-50 (copies of the BTR-50 are the Czech OT-62 and the Chinese Type 77).
- Chinese YW 531 (the North Koreans make a copy called the M-1973).
- USA's M3 half truck.

The M113 is the most widely used of its type, and more than 80,000 M113s have been built and sold to 47 countries. Some countries have fitted their M113 vehicles with turret-mounted weapons, including 7.62-mm/12.7-mm machine guns and 20-mm or 60-mm cannons. When upgunned and equipped with AP/APDS ammunition, the vehicle will be able to engage and destroy light armored vehicles in addition to providing fire support to the infantry.

These vehicles will appear on the battlefield in groups of three or four. The size of the element dismounting will be eight to twenty. The element will include an antiarmor gunner with an RPG-7 type weapon and one or two light machine guns. Figure 3-3 lists some of the characteristics of these vehicles.

Nomenclature	No. of Countries	Producers	Crew/ Pax	Weapons
M113	39	USA	2/11	12.7mm
BTR-50	22	USSR	2/20	14.5mm
M3 HALF TRUCK	16	USA	2/8	12.7mm, 14.5mm, & 7.62mm
OT-62	8	Czech	2/18	82mm, 14.5mm, & 7.62mm
YW 531 (Type 63)	9	China	4/10	12.7mm or ATGM

3. Armored Reconnaissance Vehicle.

The third most likely light armored vehicles that a US infantryman might encounter in the Third World in the future (1997-2007) will be an armored reconnaissance vehicle

It will be protected against .50 caliber armor piercing (AP) rounds. This vehicle will not have reactive armor. The vehicle will have a night sight, either an image intensifier (II) or an infrared (IR) system. The vehicle will be armed with a 7.72-mm coaxial machine gun, either a 12.7-mm (.50 caliber) or a 14.5-mm machine gun or a 30-mm, 37-mm, 60-mm, 76-mm, or 90-mm gun. The vehicle may have smoke grenade launchers. Examples of these vehicles are the

- Soviet BRDM-2 and BRDM-1 (copies of the BDRM are the Czech OT-65, the Hungarian PSZH-IV, and the Romanian FUG and FUG D-944).
- French AML-90 and AML-60.
- British FERRET, Scorpion, and Scimitar.
- USA's M8 armored car.
- Brazil's EE-9 Cascavel.

The size of the dismounting element may be three.

Figure 3-4 lists some of the characteristics of these vehicles.

4. Infantry Fighting Vehicle.

The least likely light armored vehicles that a US infantryman might encounter in the Third World (except in the Mideast) in the future (1997-2007) is the infantry fighting vehicle.

It will be protected against .50 caliber armor piercing (AP) rounds and could have add-in armor that reduces the effectiveness of 14.5-mm, 20-mm, and 25-mm ammunition. The vehicle will not have reactive armor. The vehicle will have an image intensifier (II) night sight. The vehicle will be armed with a 7.62-mm coaxial machine gun, either a 73-mm, 30-mm, or 25-mm gun, and possibly an ATGM. The vehicle will have smoke grenade launchers and a vehicle exhaust smoke system. Examples of these vehicles are the

- Soviet BMP-1 and BMP-2.
- Chinese BMP-1, NVH-1, and NFV-1.

Nomenclature	No. of Countries	Producer	Crew/ Pax	Wheels/ Track	Weapons
BDRM-1	10	USSR	2/3	4 x 4	12.7mm & 2 x 7.62mm
BRDM-2	41	USSR	2/3	4 x 4	14.5mm & 7.62mm
AML-90	32	France	3/0	4 x 4	90mm & 7.62mm
AML-60	29	France	3/0	4 x 4	60mm mortar & 2 x 7.62mm
FERRET	20	UK	2/3	4 x 4	7.62mm
M8 ARMORED CAR	16	USA	4/0	4 x 4	37mm, 12.7mm, & 7.62mm
SCORPION	14	UK	3/0	Track	76mm & 7.62mm
SCIMITAR	10	UK	3/0	Track	30mm & 7.62mm
EE-9 (CASCAVEL)	15+	Brazil	3/0	6 x 6	90mm and 7.62mm or 12.7mm & 7.62mm
BRDM-1	10	USSR	2/3	4 x 4	12.7 & 2 x 7.62mm

The BMP-1 was or is produced in the USSR, Czechoslovakia, and China. The BMP-1 is in service with the following Third World countries:

NOTE: The numbers in the parentheses following the name of the country

represent the number of vehicles each country has.

- Afghanistan (40).
- Algeria (650).
- Angola.
- Cuba (50).
- Egypt (220).
- Ethiopia (40).
- Finland (85).
- India (700).
- Iran (100+).
- Iraq (1,000).
- Jordan.
- North Korea (150).
- Libya (520).
- Mongolia (420).
- Syria (2,350).
- South Yemen (100).
- Yugoslavia.

The BMP-2 is in service in the following Third World countries:

- Algeria (50).
- Finland (20).
- India.
- Iraq.
- Kuwait (245 on order).

The Chinese version of the BMP-1 is called the WZ 501. The Chinese, in cooperation with the British, also produce and sell infantry fighting vehicles: the NVH-1 and the NFH-1, with a choice of the Rarden 30-mm, the Oerlikon 25-mm, or the Bushmaster 25-mm chain gun as the main armament.

Figure 3-5 lists some of the characteristics of these vehicles:

Nomenclature	No. of Countries	Crew/ Pax	Night Vision	Weapons
BMP-1	17	3/8	II	73mm, AT-3, & 7.62mm
BMP-2	5	3/7	II	30mm, AT-5, & 7.62mm
NVH-1	UNK	2/9	II	25mm & 7.62mm
NFV-1	UNK	3/8	II	25mm & 7.62mm

The Unofficial Glock Users Manual

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by John Leveron

Note : This is version 1.1 of the manual, and it's current as of April 13, 1997. I'm always putting together information for the next revision, so I'd appreciate it if you'd send me comments (positive and negative), suggestions, etc. via *email*. These have traditionally helped make a better Unofficial Glock Users Manual (UGUM for short). (This space is my usual plea for contact with you, the user; that's who I wrote this for, and your ideas and encouragement make a better UGUM for everyone to use). Please keep sending comments, compliments, and criticisms, thanks, and enjoy!

Also, you could bookmark this specific page, but it's better to bookmark the main Glock page as that one is guaranteed not to be moved around unnecessarily. I think it really is a better idea to bookmark my Main Page at http://glock.missouri.edu/ or the Glock Page instead.

P.S. If you haven't signed the guestbook (view it here) on my web page yet, ***please do***! It's all that I ask for anything you might have (hopefully) gotten from visiting. Thanks!

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*1. Disclaimer

Please read the entire manual before attempting any of the procedures listed in this manual. Heed all of the Notes and Safety Cautions.

This manual is intended to be supplemented by technical bulletins. Information and specifications contained within this manual may change without notification. Contact the author or Glock (address and phone information is at the end of the file) if you have any questions about a Glock pistol, and they will gladly help you out. Glock can also provide you with the closest Glock certified field representative.

This manual does not contain the actual armorer specific information. The actual armorer's manual provides basic service and backup information for Certified Glock Armorers, and is not intended for use by other personnel. Armorer certification can only be granted by Glock after attending a Glock Armorer's School.

This means if you are not a Certified Glock Armorer, do not attempt any of the Armorers tasks. Doing so can damage the pistol and cause possible serious bodily injury to the shooter or an observer. Instead, if you have access to that data, use it only for observation of how the pistol works. Please enjoy the background information and technical specifications that are listed in this file.

This document was created from the Glock Armorer's manual (dated January, 1992), my own notes, and from discussions with Glock Factory personnel. This information was current as of the date of this document, listed above.

Neither Glock, the Glock Armorer who created this document, nor anyone who disseminates this document can be held responsible for any misinterpretation of the instructions in this manual that can lead to improper functioning of the pistol. This electronic manual is not from Glock, Inc. Glock does not warrant any of the information contained in this manual.

For additional information and service guidelines contact Glock for your nearest Glock certified field representative. This manual may contain errors. If in doubt on any information, contact Glock, Inc.

If you have a Glock but don't have a factory owner's manual, call them or write them. They will send you one for free. Many other firearms manufacturers will do this as well.

Any information put out by Glock, Inc. supercedes anything on this page.

*2. Introduction

All Glock pistols are a product of modern technology, incorporating many innovative design features which result in ease of operation, extreme reliability, simple function, reduced maintenance, durability and light weight.

Mr. Gaston Glock was the first person to successfully produce a polymer handgun receiver and marry it to a strong, all steel slide and barrel. In addition to new materials and manufacturing methods, the Glock pistol has an action which combines the best characteristics of the traditional double and single action pistols, creating

what has become known as the "Safe Action" system.

Safe, simple operation, reliability and accuracy were primary design criteria. To achieve safety with simplicity, three independent safeties sequentially disengage as the pistol's trigger is pulled to its rear-most position. These safeties automatically reset themselves once the shooter removes his finger from the trigger. Glock pistols combine the safety and simplicity of revolver-like operation with a constant double action trigger pull, high magazine capacity, rapid recovery, and the reduced recoil of a modern, semi-automatic pistol.

Maintenance of the Glock is extremely simple and straightforward. A unique feature of the Glock pistol is that all parts generally are interchangeable within the same model - no hand fitting, filing or polishing is required or advised.

The polymer frame provides several advantages. It is lightweight, rust proof, and it will not stick to flesh in cold weather. The polymer frame also reduces felt recoil by "bending" from the recoil of a round being discharged. The grip, for a double stack magazine, is narrower than would otherwise be possible since there are no externally attached grips to take up any additional space.

*** The Exterior finish on Glock Pistols**

Most of the metal parts on the Glock pistol receive a finish called Tenifer. This finish is applied to a depth of three thousandths of an inch. The Tenifer finish is rated at 69 on the Rockwell hardness scale. About the only thing harder than Tenifer is a diamond or carbide. The Tenifer finish on Glocks carbon steel slide resists corrosion much better than even stainless steel.

If you somehow manage to cut through the Tenifer finish, Glock cannot "Re-Tenifer" your pistol. It would be too brittle and the metal would be subject to cracking.

The finish you see on the exterior of the slide on a new Glock pistol is not the Tenifer finish. The Tenifer is a metal process, and is colorless. The dark exterior metal is a parkerizing type finish applied over the Tenifer finish. As the pistol is used and rubbed over a long period of time, this finish may wear off in spots.

Glock can refinish this "parkerizing" type of finish if you ever use your Glock often enough and long enough to wear it partly off. Contact Glock for details and prices.

(Ed. Note : I have worn my varied Glock pistols for over 5 years next to my (often sweaty) skin. I've never noticed any corrosion due to sweat or water, even on the small sections that have lost the dull parkerizing finish. These small areas appear to have a dull silver color).

The Tenifer finish insures very good rust resistance. The slide and barrel are tenifered. The internal components, any metallic sights, and the slide stop lever are not Tenifered.

Direction Note : The terms right and left, front (muzzle) & rear, top and bottom, up and down, and forward and backward as used in this paper refer to the pistol when being held in shooting position as seen by the shooter.

*3. Basic Firearm Safety Rules

1. Always keep the firearm pointed in a safe direction.
2. Handle all firearms as if they were loaded.

3. The trigger finger stays out of the trigger guard until the firearm is on target and the decision to fire has been made.
4. Make sure the firearm is in good working order and the barrel clear of obstructions.
5. Always check your target, backstop, and the surrounding area before firing.
6. Quality ear and eye protection should always be worn while shooting or observing.
7. When storing a firearm, the firearm should be unloaded, secured in a safe storage case and out of the reach of children and untrained adults.
8. Only use ammunition recommended by the firearm manufacturer and always check caliber and condition of ammunition before loading the firearm.
9. Firearm transportation is regulated by Federal, State, and local laws. Always transport your firearm in a safe, unloaded condition and in accordance with applicable laws.
10. Certain medications, alcohol, and firearms do not mix. Never allow anyone to use firearms when under the influence of drugs or alcohol.
11. The safe and rational use of a firearm relies on common sense and proper training of the user. Follow safety rules and think before using a firearm.
12. Thoroughly read and understand the users manual that is supplied with your firearm. Never use any firearm unless you completely understand its operation and safety features.

*4. Safety Features of the Glock

The Glock pistol has no conventional, externally-located safety lever. Therefore, make sure that the trigger is touched only when you intend to fire or when verified empty, in order to perform maintenance. Having said this, there seems to be a common misconception that the Glock has no safety. This is wrong; it actually has three:

1. Trigger Safety

The trigger safety is incorporated into the trigger (part #26) in the form of a lever, and in the untouched state blocks the trigger from being moved backwards.

To fire the pistol, both the trigger safety and the trigger must be depressed at the same time.

If the trigger safety is not depressed, then the trigger will not move to the rear and the pistol will not fire. This is designed to prevent the trigger from going to the rear when the pistol is dropped.

2. Firing Pin Safety

A spring-loaded pin (#9) projects into the firing pin cutout, and blocks it. This safety is only released while the trigger is pulled.

3. Safety Function of the Trigger Mechanism Housing
(Drop Safety)

The trigger bar is pushed onto the safety ramp by the firing pin.

The safety devices 1, 2, and 3 above are designed to prevent the weapon from unintentional discharge, if dropped from up to 6.5 ft., exceeding NATO standards.

Special Warning:

In case the trigger safety proves to be ineffective for any reason, Danger of an unintentional discharge exists. The weapon is to be immediately unloaded and restricted from further use. Make sure that your weapon is properly repaired and checked by Glock or a Certified Glock Armorer before using it again!

The beauty of these three Glock safeties is that once you start to squeeze the trigger, they disengage (numbers 2 & 3 progressively) until before the moment of firing, they disengage. Upon releasing the trigger (whether the trigger was actually pulled back far enough to fire) all three are automatically reapplied! Simple, yet pretty revolutionary.

I've also heard it mentioned that some believe the Glock is 'inherently unsafe' due to it's trigger design (they cited the trigger safety projection as 'not being heavy enough'). This isn't the purpose of the trigger safety! It is to help prevent Unintentional Discharge when the trigger edge is 'snagged' by something from the side. I haven't found Glocks to have any higher rate of unintentional discharge than Berettas, etc.

Basically it boils down to this very simple premise (which I was taught, and which I teach): *keep your finger out of the trigger guard until you intend to fire!* No slightly heavier trigger will replace proper training, and if you feel the stock five pound trigger is still too light, I (or any Glock Factory Certified Armorer) can swap that out for under a buck (at cost; assuming no labor charge) in under a minute for a New York or New York Plus trigger spring (which are approximately eight and twelve pounds, respectively; the latter heavier than some other Double Action semi-auto pistols).

*5. Technical Specifications

Glock currently has pistols in four calibers for shooters in the United States. They are the 9mm Parabellum, .40 S&W, 10mm, and the .45 ACP. Glock makes pistols in .380 ACP (also known as 9 x 17mm and 9mm Kurz) for markets outside the USA.

For the magazine capacity of all pistols listed below, the maximum legal capacity (in the USA) for post-Clinton Crime Bill (do you feel safer?) magazines is 10 rounds. Police and Military still receive full capacity magazines.

Glock 17 (9mm Full Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	9 x 19 mm (Parabellum)	
Overall Length (Slide)	185mm	7.28"
Height w/ Sights	136mm	5.35"
Width	30mm	1.18"
Length Between Sights	165mm	6.49"
Barrel Length	114mm	4.49"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	17 / 19 with +2 extended magazine	

Mass (Weight)		
Empty w/o magazine	620g	21.91 oz.
Empty magazine (17 rds)	56g	2.08 oz.
Full Magazine (17 rds)*	~260g	~9.50 oz.
Muzzle Velocity *	~360 m/sec	~1180 fps
Muzzle Energy *	~500 J	~369 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 19 (9mm Compact Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	9 x 19 mm (Parabellum)	
Overall Length (Slide)	174mm	6.85"
Height w/ Sights	124mm	4.88"
Width	30mm	1.18"
Length Between Sights	152mm	5.98"
Barrel Length	102mm	4.02"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	15 / 17 with +2 extended magazine	
Mass (Weight)		
Empty w/o magazine	595g	20.99 oz.
Empty magazine (15 rds)	54g	1.98 oz.
Full Magazine (15 rds)*	~240g	~8.55 oz.
Muzzle Velocity *	~360 m/sec	~1180 fps

Muzzle Energy *	~500 J	~369 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 17L (9mm Competition Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	9 x 19 mm (Parabellum)	
Overall Length (Slide)	225mm	8.85"
Height w/ Sights	136mm	5.35"
Width	30mm	1.18"
Length Between Sights	205mm	8.07"
Barrel Length	153mm	6.02"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	17 / 19 with +2 extended magazine	
Mass (Weight)		
Empty w/o magazine	666g	23.35 oz.
Empty magazine (17 rds)	56g	2.08 oz.
Full Magazine (17 rds)*	~260g	~9.50 oz.
Muzzle Velocity *	~360 m/sec	~1180 fps
Muzzle Energy *	~500 J	~369 Ft. Lbs.
Trigger Pull	~1.5kg	~3-4 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"

Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 20 (10mm Full Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	10 mm	
Overall Length (Slide)	193mm	7.59"
Height w/ Sights	139mm	5.47"
Width	32.5mm	1.27"
Length Between Sights	172mm	6.77"
Barrel Length	117mm	4.60"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	15	15
Mass (Weight)		
Empty w/o magazine	784g	26.35 oz.
Empty magazine	65g	2.05 oz.
Full Magazine *	~325g	~11.92 oz.
Muzzle Velocity *	~370 m/sec	~1230 fps
Muzzle Energy *	~750 J	~575 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 21 (.45 ACP Full Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	11.5 x 21.3 mm	.45
Overall Length (Slide)	193mm	7.59"
Height w/ Sights	139mm	5.47"
Width	32.5mm	1.27"
Length Between Sights	172mm	6.77"
Barrel Length	117mm	4.60"
Barrel Rifling and Twist Direction	Octagonal profile with Right hand twist	
Length of Twist	400mm	15.75"
Magazine Capacity	13	13
Mass (Weight)		
Empty w/o magazine	745g	25.22 oz.
Empty magazine	65g	1.98 oz.
Full Magazine *	~340g	~11.78 oz.
Muzzle Velocity *	~250 m/sec	~820 fps
Muzzle Energy *	~460 J	~302 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 22 (.40 S&W Full Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	.40 S & W	

Overall Length (Slide)	185mm	7.28"
Height w/ Sights	136mm	5.35"
Width	30mm	1.18"
Length Between Sights	165mm	6.49"
Barrel Length	114mm	4.49"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	400mm	15.75"
Magazine Capacity	15	15
Mass (Weight)		
Empty w/o magazine	645g	22.36 oz.
Empty magazine	53g	1.87 oz.
Full Magazine *	~300g	~10.62 oz.
Muzzle Velocity *	~300 m/sec	~984 fps
Muzzle Energy *	~520 J	~386 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 23 (.40 Compact Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	.40 S & W	
Overall Length (Slide)	174mm	6.85"
Height w/ Sights	124mm	4.88"
Width	30mm	1.18"
Length Between Sights	152mm	5.98"
Barrel Length	102mm	4.02"

Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	400mm	15.75"
Magazine Capacity	13	13
Mass (Weight)		
Empty w/o magazine	597g	20.67 oz.
Empty magazine	52g	1.76 oz.
Full Magazine *	~260g	~9.35 oz.
Muzzle Velocity *	~300 m/sec	~984 fps
Muzzle Energy *	~520 J	~386 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 24/24P (.40 S&W Competition Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	.40 S&W	
Overall Length (Slide)	225mm	8.85"
Height w/ Sights	136mm	5.35"
Width	30mm	1.18"
Length Between Sights	205mm	8.07"
Barrel Length	153mm	6.02"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	15	
Mass (Weight)		

Empty w/o magazine	757g	26.70 oz.
Empty magazine (15 rds)	78g	2.75 oz.
Full Magazine (17 rds)*	~325g	~11.46 oz.
Muzzle Velocity *	~320 m/sec	~1050 fps
Muzzle Energy *	~598 J	~441 Ft. Lbs.
Trigger Pull	~1.5kg	~3-4 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 25 (.380 ACP Compact Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	9 x 17 mm	.380 ACP
Overall Length (Slide)	174mm	6.85"
Height w/ Sights	124mm	4.88"
Width	30mm	1.18"
Length Between Sights	152mm	5.98"
Barrel Length	102mm	4.02"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	15	
Mass (Weight)		
Empty w/o magazine	570g	20.11 oz.
Empty magazine	68g	2.40 oz.
Full Magazine *	~204g	~7.20 oz.
Muzzle Velocity *	~305 m/sec	~1000 fps
Muzzle Energy *	~286 J	~211 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.

Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 26 (9mm Sub-Compact Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	9 x 19 mm (Parabellum)	
Overall Length (Slide)	160mm	6.29"
Height w/ Sights	103mm	4.04"
Width	30mm	1.18"
Length Between Sights	138mm	5.43"
Barrel Length	88mm	3.46"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	10	
Mass (Weight)		
Empty w/o magazine	560g	19.75 oz.
Empty magazine	56g	1.98 oz.
Full Magazine *	~180g	~6.35 oz.
Muzzle Velocity *	~347 m/sec	~1140 fps
Muzzle Energy *	~465 J	~343 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 27 (.40 S&W Sub-Compact Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	.40 S&W	
Overall Length (Slide)	160mm	6.29"
Height w/ Sights	103mm	4.04"
Width	30mm	1.18"
Length Between Sights	138mm	5.43"
Barrel Length	88mm	3.46"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	9	
Mass (Weight)		
Empty w/o magazine	560g	19.75 oz.
Empty magazine	60g	2.12 oz.
Full Magazine *	~205g	~7.23 oz.
Muzzle Velocity *	~291 m/sec	~955 fps
Muzzle Energy *	~495 J	~365 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 28 (.380 ACP Sub-Compact Size Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	

Caliber	9 x 17 mm	.380 ACP
Overall Length (Slide)	160mm	6.29"
Height w/ Sights	103mm	4.04"
Width	30mm	1.18"
Length Between Sights	138mm	5.43"
Barrel Length	88mm	3.46"
Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	10	
Mass (Weight)		
Empty w/o magazine	529g	18.66 oz.
Empty magazine	56g	1.98 oz.
Full Magazine *	~145g	~5.11 oz.
Muzzle Velocity *	~305 m/sec	~1000 fps
Muzzle Energy *	~286 J	~211 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 29 (10mm Compact Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	10 mm	
Overall Length (Slide)	172mm	6.77"
Height w/ Sights	110mm	4.33"
Width	32.5mm	1.27"
Length Between Sights	151mm	5.95"
Barrel Length	96mm	3.78"

Barrel Rifling and Twist Direction	Hexagonal profile with Right hand twist	
Length of Twist	250mm	9.84"
Magazine Capacity	10	
Mass (Weight)		
Empty w/o magazine	700g	24.69 oz.
Empty magazine	68g	2.40 oz.
Full Magazine *	~235g	~8.29 oz.
Muzzle Velocity *	~370 m/sec	~1230 fps
Muzzle Energy *	~750 J	~575 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

All specifications subject to change without notice.

Glock 30 (.45 ACP Compact Pistol)

	Metric	U.S.
Type of Action	Safe Action (Double Action Only)	
Caliber	11.5 x 21.3 mm	.45
Overall Length (Slide)	172mm	6.77"
Height w/ Sights	110mm	4.33"
	121mm	4.76"
Width	32.5mm	1.27"
Length Between Sights	151mm	5.95"
Barrel Length	96mm	3.78"
Barrel Rifling and Twist Direction	Octagonal profile with Right hand twist	
Length of Twist	400mm	15.75"
Magazine Capacity	9/10**	

Mass (Weight)		
Empty w/o magazine	680g	23.99 oz.
Empty magazine	68g	2.40 oz.
	71g	2.50 oz.**
Full Magazine *	~255g	~9.00 oz.
	~280g	~9.87 oz.
Muzzle Velocity *	~250 m/sec	~820 fps
Muzzle Energy *	~460 J	~302 Ft. Lbs.
Trigger Pull	~2.5kg	~5-8 lbs.
Trigger Slack	10mm	0.4"
Trigger Travel for Discharge	12.5mm	0.5"
Number of Safeties	Three (3)	

* Varies depending on type of ammunition.

** The G-30 comes standard with what I refer to as the "+1 mag"; it has a longer floorplate on it than the standard size. The specs for the "+1" are listed second, when there are two specs listed. The other is for the optional, flush fit 9 round magazine.

All specifications subject to change without notice.

Note that trigger pull weight can be approximately 5, 8, or 12 lbs. when the pistol has a standard, "New York", or "New York Plus" trigger spring installed.

Also, the connectors that are rated at 3.5, 5, and 8 lbs. will change the trigger pull characteristics.

All non-competition Glock models are shipped from the factory with the 5 pound connector. The 3.5 pound model is shipped in the competition models, and is only available in them (Glock will not sell these individually, at least in the USA). The 8 pound connector is available by special order.

*6. Ammunition Specifications for Glock Pistols

Glock pistols are designed to be fired with NATO or SAAMI specification ammunition. Therefore the following guidelines and specifications are provided so that proper ammunition will be selected for use in Glock pistols to assure proper functioning.

Any deviation from these specifications may lead to improper functioning and possibly void the warranty on Glock pistols.

Glock 9mm pistols will function properly with the new generation of 9x19mm ammunition including all +P+ and 147 grain subsonic ammunition currently in use or being introduced in the United States.

Minimum (lower limit) specifications for 9mm Ammunition to be used in Glock Pistols:

```
Bullet Weight       115 grains   /   7.5 grams

Muzzle Velocity     1180 fps     /   350 meters/sec
```

Maximum (upper limit) pressures for 9x19mm ammunition to be used in Glock pistols should not exceed 43,500 pounds per square inch/ 3000 BAR.

Note that while there is no SAAMI standard for +P ammunition, the industry commonly loads the +P to slightly higher pressures than standard ammunition. +P+ ammunition is loaded to a yet slightly higher pressure. In tests I've run, the +P+ ammunition is not quite as high, interior pressure wise, as the 9mm NATO samples I've used from TZZ (aka IMI / Samson), Federal, or Winchester.

Handloaded/reloaded or re-manufactured ammunition may be unsafe and voids factory warranty.

There has been speculation by some that the use of lead bullets in particular should be avoided in Glocks due to the Polygon rifling. For more information on these thoughts, I will point you to a resource I did not write, the Glock kaBoom! Frequently Asked Questions, or, in shorter form, the kB! FAQ.

Ammunition Performance Data

(Compiled by Glock, Inc.)

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Cartridge  Manufacturer  Bullet Weight  Bullet Type  Barrel Length
Muzzle Velocity  Muzzle Energy         Penetration       Expansion


9mm (FBI)  Winchester    147 gr/9.53g       JHP     4.25" / 107.9mm
902 fps/275 m/s  265.5 ft/lbs/360J  13.99"/355.3mm   .457"/ 11.6 mm


9mm        Winchester    115 gr/7.45g      STIP     4.25" / 107.9mm
1091 fps/333 m/s 303.9 ft/lbs/412J  11.37"/288.8mm   .542"/ 13.7 mm


9mm          Federal     147 gr/9.53g    H-SHOCK    4.25" / 107.9mm
1062 fps/324 m/s 310.5 ft/lbs/421J  14.67"/372.6mm   .485"/ 12.3 mm


9mm (+P+)  Winchester    115 gr/7.45g       JHP        4" / 101.6mm
1305 fps/398 m/s   437 ft/lbs/593J   ~8.0"/203 mm    .600"/ 15.2 mm


9mm (NATO) Winchester    124 gr/8.04g       FMJ        4" / 101.6mm
1185 fps/361 m/s   387 ft/lbs/525J          N/A          N/A
```

9mm	Remington	88 gr/5.70g	JHP	4" / 101.6mm	
1500 fps/457 m/s	440 ft/lbs/597J	N/A	N/A		
.40 S&W	Winchester	180 gr/11.66g	JHP	4" / 101.6mm	
990 fps/302 m/s	390 ft/lbs/529J	12.20"/309.8mm	.650"/ 16.5 mm		
.40 S&W	Federal	180 gr/11.66g	H-SHOCK	4" / 101.6mm	
985 fps/300 m/s	384 ft/lbs/520J	14.00"/355.6mm	.690"/ 17.5 mm		
.40 S&W	Winchester	155 gr/10.04g	STIP	4" / 101.6mm	
1205 fps/367 m/s	500 ft/lbs/678J	12.70"/322.6mm	.600"/ 15.2 mm		
.40 S&W	Federal	180 gr/11.66g	JHP	4" / 101.6mm	
985 fps/300 m/s	384 ft/lbs/520J	N/A	N/A		
10mm (FBI)	Federal	180 gr/11.66g	JHP	5" / 127mm	
931 fps/284 m/s	346.4 ft/lbs/470J	17.24"/437.8mm	.547"/ 13.9 mm		
10mm	Winchester	180 gr/11.66g	JHP	5" / 127mm	
955 fps/291 m/s	364.5 ft/lbs/494J	16.61"/421.8mm	.526"/ 13.4 mm		
10mm	Norma	170 gr/11.02g	JHP	5" / 127mm	
1358 fps/414 m/s	696.1 ft/lbs/944J	18.44"/468.4mm	.562"/ 14.3 mm		
10mm	Hornady	155 gr/10.04g	JHP	N/A	
1410 fps/430 m/s	692 ft/lbs/938J	N/A	N/A		
10mm	Hornady	200 gr/12.96g	FMJ	N/A	
1150 fps/351 m/s	595 ft/lbs/807J	N/A	N/A		
.45 ACP	Remington	185 gr/11.99g	JHP	5" / 127mm	
903 fps/275 m/s	334.9 ft/lbs/454J	22.21"/564.1mm	.540"/ 13.7mm		

```
.45 ACP      Federal     185 gr/11.99g      JHP        5" / 127mm
953 fps/291 m/s    373 ft/lbs/506J    13.62"/345.9mm .623"/ 15.8mm


.45 ACP   Winchester     185 gr/11.99g     STIP        5" / 127mm
951 fps/290 m/s  371.5 ft/lbs/504J    13.58"/344.9mm .619"/ 15.7mm


.45 ACP      Federal     230 gr/14.90g    H-SHOCK      5" / 127mm
802 fps/244 m/s  328.5 ft/lbs/445J    18.28"/464.3mm .621"/ 15.8mm


.45 ACP +P   Remington   185 gr/11.99g      JHP          N/A
1140 fps/347 m/s   534 ft/lbs/724J         N/A           N/A
```

Note : *Performance levels may change when using different firearms.*
Sources : Cartridge manufacturers and FBI.

My own personal experience with my Glocks and chronograph varies somewhat with these, but I have no idea of their test conditions. For instance, in the 9mm NATO, using Winchester or Federal, I get right at 1220 fps out of my G-17.

*7. Field Stripping the Glock Pistol

The Glock pistol is field stripped into five (5) basic pieces. These are the slide, the barrel, the recoil spring/recoil spring tube assembly, the receiver, and the magazine.

-- Prior to Field Stripping, Make Sure Pistol Is Unloaded!! --

Magazine Removal

1. Point the pistol in a safe direction (a safe direction is where no one can possibly be injured in the event of an unintentional discharge). Finger OFF of the trigger and OUT of the trigger guard.
2. Press in on the magazine catch, located on the left side of the pistol at the rear of the trigger guard.
3. Remove the magazine.

Note : *The Glock pistol is designed so that the magazine catch can not easily be pressed unintentionally when the pistol is held in a proper shooting grip. For this reason you will have to rotate the hand a few degrees to be able to press the catch and release the magazine.*

Safety Caution: Prior to further disassembly, with your finger off of the trigger and outside of the trigger guard, point the pistol in a safe direction, lock the slide open by pushing up on the slide stop lever with the shooting hand thumb while pulling the slide to the rear with the non-shooting hand. Once the slide is locked to the rear, both visually and physically (with your little finger) inspect the chamber of the pistol to be sure that the chamber is empty. Also, check the magazine well to be sure that a cartridge has not become lodged between the ejector and the walls of the magazine well. Once you are sure that the pistol is unloaded, continue with disassembly.

1. Once you have verified that the pistol is unloaded:
2. Pull back slide to release slide stop lever and close action.
3. Point the pistol in a safe direction.
4. Pull the trigger. You will hear the firing pin spring forward.

Note : The trigger must be in the rear most position for slide removal.

Slide Removal:

1. Hold the pistol in either hand (shooting hand is easiest for me - Ed.) so that four fingers grasp the top of the slide and the thumb is curled under the backstrap of the receiver (the "curl" on the back of the grip). With these four fingers, pull and hold the slide back approximately 1/10th of an inch (2.5mm). (If you pull it too far back, the trigger will reset to it's forward position, and the pistol will need to be pointed in a safe direction and dry fired again to restart the slide removal - Ed.)
2. At the same time, pull down and hold both sides of the slide lock using the thumb and index finger of your free hand (the slide lock is located above the trigger guard on the polymer receiver).
3. Push the slide forward (with the four fingers grasping the top of the slide) until it is fully separated from the receiver.

Note : *Do not attempt to manipulate the trigger while the pistol is disassembled. Unless you are an Armorer and have received training on "Function Testing the Trigger Safety", covered later, you may damage the trigger mechanism.*

Barrel Removal
Safety Caution: The recoil spring is under tension! During removal use care to control the recoil spring and/or recoil spring tube.

1. Push the recoil spring tube slightly forward while lifting it away from the barrel.
2. Remove the recoil spring tube and recoil spring.

Note : *Glock introduced a combined recoil spring tube and recoil spring, with the nomenclature "Recoil Spring Assembly" in 1991. If you do not have a separate recoil spring tube and recoil spring in your Glock pistol, you have the newer modification.*

The instructions will refer to a recoil spring tube and recoil spring; you may substitute "Recoil Spring Assembly" as appropriate. There is nothing wrong with the older version, however. Do not attempt to disassemble the one piece recoil spring assembly; it does not need to be disassembled and trying to do so will break it.

The Glock is now field stripped. The average user should not attempt to disassemble the pistol any further per Glock, Inc. Field stripping is all that is necessary for routine cleaning.

*8. Reassembling the Field Stripped Glock Pistol

Reassembly Note:
When installing the recoil spring tube and recoil spring, be sure that the back end of the recoil spring tube rests in the half moon cut in the bottom of the front barrel lug. If it is not properly seated and you reassemble the pistol, the recoil spring tube may be damaged.

Barrel and Recoil Spring Tube/Recoil Spring Reassembly

1. Lay the pistol slide upside down.
2. Grasp the barrel at the chamber. While raising the chambered end, move the barrel slightly forward.
3. Guide the muzzle of the barrel into the circular hole in the front end of the slide.
4. Install the recoil spring tube and recoil spring.

Slide Reassembly

1. Point the receiver in a safe direction.
2. Grasp the slide at the back.
3. Align the cutouts on the rear of the slide near the bottom with the forward slide rails on the polymer receiver.
4. Slide the slide back until you can engage the slide stop lever.
5. Engage the slide stop lever.

Note : *Once the slide is locked to the rear, both visually and physically (with your little finger) inspect the chamber of the pistol to be sure that the chamber is empty. Also, check the magazine well to be sure that a cartridge has not become lodged between the ejector and the walls of the magazine well.*

(Ed. note - try to get in the habit of a visual and physical inspection of all of your firearms now. It is easy to overlook something when using the eyes alone, and you can't rely on your eyes in anything but bright light)

1. Once you have verified that the pistol is unloaded:
2. Pull back slide to release slide stop lever and close action.
3. Point the pistol in a safe direction.
4. Pull the trigger. You will hear the firing pin spring forward.

The Glock pistol is reassembled.

*9. Magazine Disassembly / Reassembly

Caution : The magazine spring is under tension. Be sure to maintain downward pressure on magazine spring with your thumb while disassembling.

For all standard floorplates (that have no holes in the bottom and are not a "+2" floorplate), hold the magazine upside down in your shooting hand, thumb on the right side of the magazine near the floorplate, fingers curled around the magazine and touching the front of the magazine.

Press inward with the thumb and first finger as you press the magazine floorplate forward. As soon as the floorplate starts to move, reposition hand so thumb retains magazine spring.

Remove the floor plate, magazine spring, and follower.

To remove the floor plate (standard Glock magazines after 1990 were shipped with a new locking device in the form of a mag reinforcement plate) when equipped with the magazine reinforcement plate (floorplate has a hole in the bottom) :

1. Insert punch into circular indentation in floorplate, push reinforcement plate up inside magazine tube, then remove floor plate the same way as the standard floorplate.

This is the official method on paper. A method I was taught at the Armorer's school which works on pre-ban (and those post-ban 10 round magazines) is (ASSuME-ing you're right handed):

1. Hold the magazine in your left hand, front of the magazine oriented up, floor plate by your thumb.

2. A 3/32" punch (the diameter of the famed Glock Armorer’s Tool) or similar object for the right hand.

3. With said punch, push in the button on the bottom of the magazine.

4. Place one of the rear corners of the floorplate against your tabletop.

5. Press the corner into the tabletop. The floor should start to slide forward.

It helps to squeeze in the sides of the magazine body near the floorplate.

The magazine tube, the follower, the floor plate (if so equipped), and the magazine spring may be cleaned. Do not lubricate anything within the magazine. Insure that all surfaces are wiped dry after cleaning and before reassembly.

To reassemble the magazine, locate the magazine spring. Place the larger diameter end of the magazine spring on the table top. Reattach the magazine follower to the top (narrow) end of the magazine spring.

Place the magazine larger end down on the table top. Note which way the magazine and the magazine spring "lean" while their bases are flat on the table top. Insert the magazine spring and attached follower into the magazine tube so that they are leaning the same way. The magazine follower should have the caliber stamp visible to the front of the magazine feed lips (when viewed from the top of the magazine).

Reinsert the reinforcing plate (if so equipped) in the magazine tube below the base of the spring. You will then have to carefully compress the magazine spring at the bottom of the magazine tube. Slide the floorplate back onto the magazine tube fully to complete the reassembly process.

You may also determine if your Glock magazine is a "drop-free" model or the original "non-drop-free" type. Look at the top back of the magazine. You will see either a rectangular notch or a semi circle cut out of the magazine. If it is a semi circle, the magazine is an original style, non "drop-free" type. If it is rectangular, it is a newer "drop-free" model. Incidentally, the Glock 26 and above never had a "non-drop-free" type; they are all the drop-free variety.

With the slide, barrel, recoil spring tube, recoil spring, polymer receiver, and (disassembled) magazine, the Glock pistol is completely field stripped. Further disassembly is not required for normal cleaning and maintenance. Further disassembly should be completed only by a Glock Certified Armorer.

*10. Preventative Maintenance:

Note : *You must field strip the pistol to perform Preventative Maintenance.*

The Glock pistol requires periodic cleaning to insure proper function. Once field stripped, the barrel and the chamber are easily cleaned from the chamber end. Do not clean the barrel from the muzzle (front) end. Doing so is probably the leading cause (for the average shooter) of "wearing out" any barrel.

The inside of the slide and receiver should be wiped clean. Standard firearm solvents can be used on the pistol (I recommend Break-Free CLP; it is what is used at Glock H.Q.; -never- use WD-40 on any firearm - Ed.). This will insure proper functioning of a new Glock pistol.

The copper colored lubricant that is found on portions of a new Glock slide should not be removed, as it will assure long-term lubrication of the slide.

As with any semiautomatic pistol, Glock pistols should not be cleaned by merely locking the slide to the rear and inserting the cleaning rod from the muzzle end. This can (and will for sure, eventually - Ed.) cause excessive amounts of solvents to build up in both the frame and slide, and possibly contribute to malfunctions of the pistol. The pistol should be field stripped every time it is cleaned.

(Note : We're talking about gummy build up in the internal firing pin channel of the slide. If it becomes gummy in there, the firing pin will be slowed down or blocked and may not set a round off reliably. The other problem is possible primer contamination by an oil or solvent that gets on the primer. If the primer gets contaminated, the round won't go off. This applies to any semiautomatic pistol - Ed.).

(Make sure when you clean the breech face that the slide is muzzle down (so gravity directs crud away from the firing pin hole); I don't like to introduce solvents or oils here, either. Bad news - Ed.)

The inside of both the chamber and barrel should be wiped completely dry once they have been thoroughly cleaned. The breech face and the area under the extractor claw should be both absolutely dry and free of any debris after cleaning.

The slide rail cuts should be cleaned thoroughly by using a clean patch on the end of a toothbrush-type cleaning tool.

With the clean patch wrapped over the brush portion of the toothbrush, thoroughly clean the slide rail cuts of all debris and solvents.

All other areas of the slide and frame (polymer lower receiver) should be checked for cleanliness. Most parts in the frame are accessible and can be wiped with a clean, soft cloth that has been very slightly dampened with a quality firearm cleaning solvent.

After the parts in the frame have been cleaned, they should be wiped dry with a clean, soft cloth. All solvent should be wiped from the parts so that they are clean and dry.

*11. Lubricating the Field Stripped Glock Pistol

To properly lubricate your Glock pistol after it has been thoroughly cleaned and dried, use a clean patch that has been very slightly dampened with a quality gun oil.

Wipe the barrel and the barrel hood (the front of the square piece's top edge at the chamber end of the barrel). Wipe the inside of the slide where the barrel hood rubs against the slide, and inside the ring on the muzzle end of the slide.

You can take one drop of oil on your finger and rub each slide rail, or put one drop of oil in each slide rail cut. Once the slide is moved on the receiver after reassembly, the oil drop will be distributed equally in the slide rails by moving the slide.

Note : *There is one most important point to lubricate (with one drop of quality gun oil) (I prefer Break-Free CLP - Ed.). You must lubricate the point where the trigger bar meets the connector. This is towards the back of the polymer receiver on the right side; (see Function Testing the Trigger Safety before pulling the trigger when the pistol is disassembled) - when you pull the trigger you can see where the back of the trigger bar rubs on the connector. Repeating, it is most critical that this point be very lightly lubricated.*

*12. Dry Firing the Glock Pistol

It is perfectly safe and normal to dry fire the Glock pistol when it is assembled.

However, when the pistol is disassembled, do not pull back on the back lug of the firing pin and let it snap forward. This can damage the firing pin and/or the firing pin safety. This condition can only be created by hand with the pistol disassembled.

Do not put any oil or solvent inside the firing pin channel or in the magazine / magazine tube. The firing pin channel, the magazine tube and other magazine components, and the breech face should be wiped completely dry before reassembly.

Leaving solvent or lubricant in these areas could cause contamination of primers and failure to fire (plus it attracts carbon and crud like a magnet - Ed.).

*13. Function testing the Glock safeties

Function Testing the Trigger Safety

Once the slide is removed from the receiver the trigger safety can be function tested in the following manner. Look at the right side of the pistol. At the very top just behind the trigger a small piece of metal is sticking up from inside the polymer receiver that is part of the trigger bar.

Push forward on this vertical extension of the trigger bar until the trigger is in its forward position. If you then let go of the vertical extension, the trigger should remain in it’s forward position. This verifies the proper function of the trigger safety.

Do not pull the trigger after the slide has been removed, as the trigger safety is resting against the rear of the frame. This can damage the trigger safety by breaking off the portion of the trigger safety that actually prevents the improperly touched trigger from moving to the rear.

Also, do not pull the trigger when the slide is on the pistol, the trigger is in its forward position, and the slide is held to the rear with the slide stop lever. This can also damage the trigger safety.

Both of these are artificial conditions that do not occur during normal firing.

Glock pistols - Function Testing the Firing Pin Safety

The firing pin safety is on the underside of the slide near the breech face. It is a metal circle approximately 4 mm across. Hold the slide in a muzzle down position and depress the firing pin safety. The firing pin should move forward and the firing pin nose should be visible protruding through the firing pin hole. The firing pin may need to be pushed forward when the pistol is new so that it will protrude from the firing pin hole.

A second method of checking the firing pin safety for proper free movement is to depress the firing pin safety and shake the slide. With the firing pin safety depressed the firing pin should be heard moving freely back and forth. When the firing pin safety is not depressed, the firing pin should be nearly silent.

Next, make sure that the firing pin safety is properly engaged. Locate the firing pin extension on the underside of the slide near the rear. Hold the slide at the rear and push the firing pin extension towards the muzzle (front) of the slide. The firing pin should not protrude through the firing pin hole. If it does, the firing pin and firing pin

safety should be replaced by a Glock Certified Armorer.

If the firing pin does not move freely back and forth and you don’t have a new Glock, the firing pin channel could be clogged with debris. Have a Glock Certified Armorer clean the firing pin channel (this requires complete disassembly of the slide and is therefore an Armorer’s task).

Most debris collects in the firing pin channel due to improper cleaning. NEVER spray anything into the firing pin hole. ALWAYS field strip your pistol and clean the barrel from the breech end (while separated from the pistol).

Function testing the Drop Safety

This safety is an internal "stepped shelf" system that requires the trigger be pressed to the rear in order for the firing pin to be released (so it can spring forward discharging a round of ammunition). There is no user test for this safety.

*14. A word on different type of Glock Trigger pulls

Glock pistols are normally shipped from the factory with a standard 5 lb. trigger pull. This is fine for most users.

There are two items that combine to make up the Glock Trigger pull. These are the Connector and the Trigger Spring.

Glock pistols normally come with the 5 lb. Connector and a standard 5 lb. coil type Trigger Spring. With the standard 5 lb. Connector in place, two additional trigger pulls are available. The 8 lb. leaf type Trigger Spring is commonly called the New York Trigger Spring. This spring increases the 5 lb. trigger pull to 7.5 - 8.5 lbs.

The second or stronger version of the leaf type spring is commonly called the New York Plus Trigger Spring. This spring increases the 5 lb. trigger pull to 9-11 lbs., making it more similar to a double action revolver type trigger pull.

The 8 lb. connector is only used with the 8 lb. coil type Trigger Spring. The difference between the 8 lb. coil Trigger Spring versus the 8 lb. New York Trigger Spring is that the NY version has continuous resistance through the whole arc of the trigger pull. The coil version is more like the traditional two stage pull in that the first part of the pull is long but relatively "lighter", and the full resistance is only found more towards the rear of the trigger pull.

The New York type triggers originally had leaf type spring. The newer variants have coil type springs. An original New York 8 lb spring was black and had no + sign on it. Some original New York Plus springs were black, and later white. They both had a + symbol on them.

The new coil type NY triggers are Olive Green for 8 pound and Orange for 12 pound.

Glock also offers a 3.5 lb Connector for their Competition Models, the 17-L, 24, and 24-P. This provides a very light and easy trigger pull and is designed for competition shooting only. This trigger weight is not suitable for defensive pistols and is not available on any model other than a Competition Model. It is the standard (and only) trigger available on the Competition Models.

You can have your trigger pull "adjusted" to a standard 5 or 8 lb coil type, or an approximate 8 or 10 pound New York type trigger pull by a Glock Certified Armorer.

*15. A Word about Barrel types

The barrel in Glock pistols is forged from a single piece of metal. It is placed on a mandrel and the rifling is literally "hammered" made, taking the shape of the mandrel, which at Glock is polygonal.

The Glock pistols use polygonal rifling instead of traditional "cut" rifling. There are no lands and grooves as such in the barrel. All Glock pistols except the Model 21 use Hexagonal polygon rifling. The Model 21 uses Octagonal polygon rifling due to the larger barrel contact area of the .45 ACP bullet.

Polygon rifling provides several important advantages. It is easier to clean since there are no square indentations for powder and copper/lead fouling to accumulate in.

When compared to cut rifling, polygon rifling does not deform the projectile as much when the barrel "grips" it during passage down the bore. This increases accuracy because a more deformed bullet does not fly as accurately as a less deformed bullet.

The polygon rifling also lets less of the expanding gasses "blow by" (actually around) the projectile. This is because of the inherently tighter fit of the angle of the barrel to the projectile. Velocity is higher with a polygon rifled barrel versus a cut rifled barrel, all other variables (length, etc). being equal.

The side benefit of this higher velocity is greater energy from the same round from a Glock barrel versus a traditional barrel.

Glock barrels receive the Tenifer finish both inside and out. This finish allows them to have a much longer than normal barrel life. *(Ed. Note : A firearms writer of some repute, Chuck Taylor, has completed an over 75,000 round test on a Glock 17. At the end of the test, the Glock was still shooting average groups of less than 3 inches with all types of ammunition from a ransom rest at 35 meters. This is astounding barrel life. Most pistols have no rifling by the throat after 10 or 15 thousand rounds).*

*16. Glocks Sights

The Glock pistols use either a standard Polymer Sight (fixed or adjustable) or a fixed metallic Trijicon or Meprolight night sight. My recommendation on installing the sights (and adjusting the fixed varieties): this task is best left to a Glock Certified Armorer or a competent gunsmith.

Sight installation (and fixed sight adjustment) require a special sight pusher tool made by Glock. Attempts to drift the rear sight, such as with a brass or plastic hammer and punch, will break the sight.

(Ed. note - If you try it, you'll then have to purchase a new sight, as well as have it installed for you anyway. Save the trouble and get it done right; my sights have never needed adjusting after the initial adjustment)

(Ed. note continued - I do not like the plastic adjustable sight at all. I believe it is too fragile for duty use. I prefer the fixed plastic sight to the adjustable for any duty/defensive use. I much prefer the metallic Trijicon Night Sights to any of the plastic varieties. It may not be the best target sight, but it's a good three dot type combat sight).

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    Glock polymer rear sights come in five varieties.  They are:


Sight Marking        Height (mm/in)     Remarks

*************        **************     *************************
```

---	7.3 / 0.29"	Highest impact

---		High Impact
-----	6.9 / 0.27"	Standard on .45, 10mm models
-----	6.5 / 0.256"	Standard on 9mm, .40 S&W models

---	6.1 / 0.24"	lower impact
(blank)	6.1 to 7.3/ 0.20" to 0.29"	click adjustable rear sight

Note: *If you want to shift the point of impact on your target to the left, you have to move the rear sight to the left and vice versa for the right (left and right in muzzle direction).*

Point of Impact	Action Needed
Left of Center	Move rear sight right
Right of Center	Move rear sight left
Low	Have higher rear sight installed
High	Have lower rear sight installed

Each change in the fixed sight increment results in a 3" change in round impact at 25 yards.

*17. Service Procedures and Trouble Shooting

(Note : an asterisk (*) in the Correction column means that a Glock Certified Armorer needs to perform this task)

-- Stoppages --

Observed Problem	Probable Causes	Corrections

Fail to Extract	Extractor Worn/Broken/ Missing	Replace
	Over-powered, Under-powered, or defective ammunition	Change Ammunition
	Dirt under extractor claw	Clean extractor and check function
	Dirty chamber	Clean Chamber
	Shooting with an unlocked wrist	Lock shooting hand wrist
Fail to Eject / Erratic ejection (including stove pipes)	Broken/damaged ejector	*Turn in to Armorer (replace trigger mechanism housing w/ ejector)
	Under-powered Ammunition	Change Ammunition
	Dirty chamber	Clean chamber
	Shooting with an unlocked wrist	Lock shooting hand wrist
	Lack of lubrication	Lubricate
	Dirty gun	Clean
Failure to Feed	Magazine not properly inserted	Reinsert magazine
	Under-powered Ammunition	Change Ammunition
	Dirty chamber	Clean chamber
	Shooting with an unlocked wrist	Lock shooting hand wrist
	Tight Extractor	*Turn in to Armorer
	Deformed magazine (magazine sides or lips deformed / dented)	Replace magazine
	Weak recoil spring	Replace

Slide fails to lock open after last round	Magazine follower broken	Replace follower
	Dirty Magazine	Clean and inspect Magazine
	Weak Magazine Spring	Replace if necessary
	Worn slide stop lever notch	*replace
	Dirty gun	Clean
	Needs lubrication	Lubricate
	Deformed magazine	Magazine sides deformed by trying to load too many rounds - replace magazine
	Under-powered Ammunition	Change Ammunition
	Shooting with an unlocked wrist	Lock shooting hand wrist
	Trigger pin inserted too far	*The trigger pin may be inserted too far to the left. This can cause the spring on the slide stop lever to bind. Check to see if the slide stop lever moves freely. If not, press the trigger pin slightly to the right until the slide stop lever moves freely.
	Slide stop lever worn or damaged	Inspect and replace if necessary.
--Failure to Fire--		
No primer strike	Slide out of battery (DON’T force into battery) due to:	

	Deformed/defective round	Inspect and replace round
	Under-powered Ammunition	Change Ammunition
	Damaged/weak recoil spring	Replace recoil spring
	Damaged recoil spring tube	Replace recoil spring tube
	Shooting with an unlocked wrist	Lock shooting hand wrist
	Barrel, slide, and receiver mating surfaces are excessively dirty	Field strip and clean
	Gun dirty / obstructed chamber	Clean chamber
Light, centered strike	Hard primer (Submachine Gun ammunition)	Change Ammunition
	Obstructed firing pin channel	*Remove, inspect and clean firing pin and firing pin spring. Clean firing pin Channel.
--Inconsistent trigger pull or trigger will not release--	Connector loose in housing	*Replace housing
	Pistol excessively dirty	Field strip and clean
	Wrong trigger bar	*Replace
	Connector needs Lubrication	Field strip and oil.
	Trigger bar is bent or damaged	*Replace trigger bar
--Trigger safety fails to return to	Improperly stored in original box with	*Replace Trigger Bar. When stored in original

forward/engaged position--	trigger in full forward position (trigger safety fully depressed)	box, pistol must be unloaded, trigger in back position.
--Firing pin fails function test as described in this manual--	Damaged, worn, or defective firing pin safety	*Replace both firing pin and firing pin safety
--No primer strike--	Worn or broken firing pin tip.	*Replace
	Obstructed channel.	*Clear
	Spring cups inverted.	*Change
--Light off center strike--	Tight extractor	*Change
	Dirty gun	Field strip and clean
	Slide Lock reversed or not beveled.	*Replace
--Locks open early--	Improper hand position	Change grip
	Reverse tension on slide stop lever spring	*Replace
	Damaged slide stop lever	*Replace

*18. Special Features of the Glock 17

The Glock 17, NATO Stock Number 1005/25/133/6775, is a versatile pistol. It may be equipped with an optional set of maritime spring cups. These are two small parts within the firing pin assembly. The maritime spring cups are only available from Glock by special order, and are not included on any Model 17 sold by Glock.

Warning: ***Do not attempt to do the following!*** *It is an extremely dangerous activity. This information is included only to show the versatility and Special Warfare uses of the Glock 17 pistol. Following these instructions can lead to serious bodily injury or death.*

Note : Glock and this Glock Armorer specifically disclaim any liability from anyone attempting to perform or performing underwater firing. This is only for trained personnel wearing proper equipment to protect themselves from the effects of firing ammunition underwater. You have been warned!

The Glock 17 pistol is capable of firing repeatedly while submersed under water. The action will cycle reliably, if a little bit slower while submersed. NATO specification ammunition, such as Winchester's Ranger RA9124N, with waterproof sealed primers and case mouths is recommended.

This applies only to the Glock 17 pistol. Never attempt to perform any underwater firing with any other Glock pistol than the Model 17 as the pistol may literally blow up. Only the Glock 17 was designed and intended to accept modified spring cups to perform underwater firing, and only the Model 17 is designed to remain within acceptable pressure limits when fired underwater. The other pistols all generated too much internal pressure upon firing to be safe, especially the .40 S&W pistols.

The maritime spring cups insure that water can pass by the firing pin within the firing pin channel. These spring cups prevent the creation of any hydraulic force within the firing pin channel (which would slow the firing pin down, causing lighter primer strikes).

The user of the Maritime spring cup-equipped Glock must keep several things in mind. They must use only full metal jacket, ball type ammunition. This is because the water within the barrel of the submersed Glock 17 will spread the hollow point out within the barrel itself upon firing. The hollow point would cause further increased pressures by increasing the bearing surface of the bullet to the barrel.

It also would not be as accurate as it would expand further yet upon leaving the barrel, and would slow down very quickly while tumbling. Think of it as the bullet has entered ballistic gelatin. That is what the water is like in the barrel upon firing.

The Glock 17 also must be fully submersed underwater. There must not be any air left within the pistol. The user after fully submersing (himself and) the Glock 17 normally points the muzzle towards the surface of the water and shakes the Glock 17 vigourously to allow any air (especially in the barrel) to escape.

At least one specialized Scuba diving group regularly uses their Glock Model 17's to dispatch sharks where they dive. The Glock 17 using NATO specification ball ammunition will completely penetrate a minimum of one 1/2" pine board at a distance of ten feet from the muzzle when fired underwater.

The ability of the specially equipped Glock 17 is normally only of any use in some specialized warfare situations. It is included here only to show how this pistol is sometimes usable (and has been used) by various Special Warfare units.

(Pictures of this on my web pages are done by a properly trained Navy gentleman. Suffice it to say, having suited up and done this on numerous occasions myself, that the sound pressure underwater is distinctly worse than in air, and there are traumatic effects probable on several bodily organs within any unproperly protected human torso from the shock wave during firing. - Ed.)

To answer a question that have popped up on the glock-l and rec.guns net groups from time to time, is the G-17 audible above water when it is fired underwater?

This varies somewhat based on the gas volume of the particular load the operator is using. In testing with some east coast Seals, I found that if the G-17 was shot from at least five feet below the surface (or lowest wave trough), and the shot was at least parallel to, or away from the surface, then that shot was inaudible topside.

However, under water, the shot was audible for one heckuva long way. No mistaking that for something else for anyone who's ever heard it before. And I'd imagine anyone could guess it. The pressure waves are also felt for some distance away from the pistol, and they reverberate off of anything hard, and are absorbed rather well by a soft body (like a human's).

Pictures of underwater firing with my Glock 17 are over here.

*19. The Glock 18 Select fire Machine Pistol

The Glock 18 is a specialized model only available to police and the military. It is a selective fire machine pistol chambered for the 9mm Parabellum cartridge. It is based on the Glock 17. The dimensions of the slide, receiver, etc. of the Glock 18 have been specially modified so that they are not physically interchangeable with the Glock 17.

The Glock 18 fires from a closed breech position similar to the M-16 rifle and differing from the open bolt position of most earlier full automatic designs.

The cyclic rate of the Glock 18 using NATO specification ball ammunition is approximately 1200 rounds per minute. This is an extremely fast cyclic rate.

The Glock 18 was developed to fulfill a counter terrorism / executive protection role. It combines high firepower with concealability. The Glock 18 is normally carried with the 19 round "Plus-2" magazine, giving it a total of twenty rounds when fully loaded with a cartridge in the chamber. This provides for concealability.

A special extended magazine of 33 rounds capacity is available for the Glock 18. It extends downward from the butt of the pistol when fully inserted. This magazine is physically compatible with the Glock 17 and 19, but sales of the 33 round magazine are restricted to Law Enforcement Agencies and the military per Glock policy (even prior to the "Crime Bill" in the USA).

The selector switch itself is located on the left rear portion of the slide. It is a circular dial with a lever. The dial has two markings; a single dot at 11 o'clock and two dots at 7:30. When the dial is positioned at the single dot, the Glock 18 performs similar to a semi-automatic Glock 17. When the dial is positioned at the two dot setting, the pistol is in full automatic mode.

The Glock 18 was designed in part so that counter terror unit operators could wear the pistol concealed when on assignment. It is easily the best machine pistol I've ever fired.

*20. New Glock Models

In 1994 Glock introduced a new competition model chambered in .40 S&W. This model is designated the Glock 24. It is pretty much identical to the model 17-L with the exception of the caliber. It is also available in a ported barrel model (to minimize shot to shot recovery time and muzzle flip). It is designated the Glock 24C. I like the 24C and may well own one someday. It was a joy to shoot, having less perceived recoil w/ full power loads than even my G17! Even the muzzle flip was barely perceptible with major loads.

Glock has it's .380 pistols available only for sale in markets where the 9x19mm is forbidden to private citizens. I have seen the Glock 25, but not the 28. It was made in .380 because most European countries forbid private citizens to own anything chambered in the more powerful "military chamberings" such as 9mm Parabellum. US citizens, you're not missing anything here :)

Glock has just introduced the models 29 and 30, their compact big-bores, as of this version of the UGUM. Field reports are trickling in on the 30, and suggest that it has possibly even less perceived recoil than the G-21, if that is possible! As was the case with the 26 and 27, demand will very probably outrun supply of these new compact big-bore Glocks.

Glock is expected to come out with a carbine shortly. One person I know at Smyrna was appalled that Ruger

beat them to the punch with their carbine. This carbine will use the Glock pistol magazines of like caliber.

Up Until now, Glock had only one factory compensated handgun available on the market, the Glock Model 24C competition pistol. (originally, the 17-L also had cut compensator ports). But, that's all history now because Glock has introduces a new series of "C" line ("C" stands for compensated) handguns in 9mm, .40 S&W and .45 ACP.

The new Glock "C" model compensators are designed unlike any other compensators I've seen in the gun market. These come with two machined ports opposed at what "eyeball approximates" as a 25 degree angle offset to either side of the bore centerline.

The slide has two corresponding long slots located near the front sight (most compensators have in-line ports on the top center of the barrel and slide). As with all ports, these are also designed to reduce muzzle flip which allows for quicker on-target recovery. When field-stripped, the new compensated Glocks look exactly like their counterparts, with the exception of the port holes in the barrel and slide.

Glock's design of the compensator port slots on either side of the front sight is designed to help reduce muzzle flash in the shooter's direct line of sight and eliminates lessens the common fouling of the front sight.

Like the current Glock Model 24C, the new compensated Glocks will add the suffix letter "C" after the model number, i.e., 17C, 21C and 22C, to designate the modified pistols as opposed to giving them new model numbers. Hopefully if they introduce their .40 S&W pistols with .357 SIG barrels, they will follow this same pattern.

I personally doubt that Glock will introduce the C line in sub compact guise, so a 26C or 27C may not be on the horizon. But I've certainly been wrong before! And for now, it is uncertain if Glock will sell just the C barrel and slide (so you could upgrade your current Glock 9mm/.40 S&W/.45 caliber with the new components). I've gotten reports both ways, so we'll just have to wait and see on this one.

For those Glocksters like Mark Gibson, the man who runs the Glock-L mailing list, who are G-20 (10mm) afficionados, you may have to wait a while for your compensated model. Glock may "make it happen" if the other C models prove successful. Although it's a great caliber, it has always taken a back seat in the sales arena to it's big bore sibling, the .45 ACP.

(Ed. note - I would caution defensive users to forego the C model as a defensive pistol. It will lose some velocity, have more "flash" that the same non-compensated version, and may injure you if you are above the ports when it is fired. I've seen several students picking bits of jacket material out of themselves after firing when flesh was in line with the ports of other pistols! Until I can evaluate if the Glock is any better in this regard, I will ASSuME that it isn't, for safety's sake).

While I may not use a C model for defense or duty, I think it'd be neat for plinking and some competition uses. Cost of the new Glock "C" line models should be only a little more than the similar uncompensated model. The compensated models are currently becoming publicly available.

As to a Glock shotgun, I think it'd be neat, but not particularly feasible in the current US market. We are already beginning to heavily restrict our semi-auto "mean looking" shotguns, as well as limiting their capacity. This will probably not look like a good investment to Herr Glock.

One thing I think (and hope) we will eventually see is a Glock .22 pistol. It would be a perfect woods gun, in my opinion, and would be a good addition on fishing trips as well. I would also love a conversion kit or top to make current big bores able to plink with the familiar .22 rimfire fodder.

*21. Miscellaneous Glock History and Facts

First, some background and history, and we'll start letting loose with the factoids as we wade in. The Glock Model 17 was successfully introduced in 1983 by Gaston Glock, engineer and founder of Glock Ges. m.b.H., located in Deutsch-Wagram, Austria. Mr. Glock's company was established in 1963 and had previously manufactured a variety of commercial appliances as well as various police and military related products (including special warfare hand grenades, and durable, lightweight bayonets and entrenching tools).

Having never before designed or manufactured a firearm, Glock assembled a brilliant panel of gun designers and experts from around the world to design a new handgun for evaluation and testing by the Austrian Army. Many other major firearm's manufacturers had also bid on the same contract to provide 25,000 9mm semi-automatic combat handguns. This bid required that every competing handgun pass an initial screening process. Thereafter, the remaining qualified handguns would be rigorously tested.

Part of the design specification included the requirement that the pistol parts be completely interchangeable. Glock had no problem here; no part is hand fit on any Glock model. The first prototype handgun submitted by Glock not only passed the initial screening, but in typical Glock style, vastly exceeded the rigorous test requirements that followed.

Prior to 1983, Glock applied for a bid to provide 25,000 handguns for the Austrian army. Having never before designed or manufactured a firearm, Glock assembled a brilliant team of gun designers and experts from around the world to design a new handgun for evaluation and testing by the Austria army. Glock did some innovative things because he didn't know that "that's impossible!"

The original Glock pistol, the model 17, is simple but innovative handgun. It not only represented possibly the most exciting and successful idea in handgun history, but soon developed a trendsetting design that included a limited number of components (initially only 32), a new safe-action system with soft recoil, and low weight through the use of space-age polymers that are stronger than steel at only 14% of the weight. The Glock pistol frame can also withstand extremely high and low temperatures without structural damage.

Glock handguns are among the finest combat-ready handguns that exist today. Originally designed in the early 1980's for the Austrian military by plastics expert Gaston Glock and a team of handgun experts, Glock pistols have taken the world by storm. They represent perhaps the most important breakthrough in handgun technology since the Colt .45 1911. Since their introduction in the U.S. in 1986, Glock pistols have been adopted as issue weapons for more than an estimated 60% of the law enforcement agencies in the United States, and are in use worldwide by law enforcement and military units alike.

With 1986 as the start point for Glock, Inc. in the USA (in Smyrna, Georgia, what I saw as a pleasant suburb of Atlanta) & the introduction of the Glock pistol to US shooters (in 1996 Glock celebrated their tenth anniversary in the U.S.A.)

Although they are sometimes disparagingly referred to as "Combat Tupperware", their frames are sturdier than almost any other pistol design out there. I must admit I was one of the people laughing at Glocks when they hit the U.S.A. although I've atoned for my sin now <grin>.

Glock pistols were probably first known for the controversy surrounding them when they were first introduced to the United States. Specifically, Glocks were the first of the commercially successful "Plastic Guns", and many myths and half-truths about the guns were spread by a few influential people, and reinforced in other ways, such as by Hollywood and our media.

Glock frames and a few other assorted pieces are made of high strength polymer (aka plastic). To many

ill-informed people, this made the Glock the "perfect terrorist weapon", as it would be "undetectable by metal detectors". Bruce Willis's character in the movie "Die Hard" didn't help, when, during a Glock's first known appearance in motion pictures, referred to the fictional "Glock 7" (it was a 17) as a "ceramic gun" and implied that it was used extensively by terrorists to hijack planes.

Glock slides, barrels, and many other parts are steel, and even the plastic frame has steel pieces molded into it. They can and are detected by metal detectors. I've had this debate with others who insisted they knew how it works. I usually save my introduction for last.

There is far more metal in a Glock pistol than in many small semi- automatics. The plastic frame is even readily apparent on any airport x-ray machine! And what good would it do, even if it were "undetectable", without some cartridges to fire? (one 9mm round will set off airport metal detectors, and is certainly readily visible under an x-ray machine)

Today, most (though by no means all) of the "Plastic Gun" paranoia has gone way. It's a tribute to Glock's sucess that the newest models of pistols from respected handgun companies such as Heckler & Koch, Ruger, and Smith & Wesson are all plastic-framed guns. S&W's Sigma series is nearly an exact copy of the Glock, with numerous parts being interchangeable (and the subject of a lawsuit, which, in this case I believe is justified and that Glock will win).

While Colt's entry into the plastic framed world did not fare well, I believe that if the rumored plastic version of a compact Sig Sauer takes to the market, it will do well also.

In the U.S., Congress actually tried to ban importation of the Glock. The media (as already mentioned, and namely the television press) were quick to attack what they referred to as the "plastic" Glock because they wanted to believe that it could escape detection by our airport screening equipment. Others in the media attacked it saying that it was the handgun most preferred by terrorists. Soon, the Democratic Congress added to the confusion and tried to enact several unsuccessful Bills to totally ban the importation of all "plastic" handguns, including Glock pistols, into the U.S.

Currently, there seems to be a disappointing return to this, with Senator Barbara boxer introducing similar legislation, calling any pistol that melts below around 800 degrees Fahrenheit a "junk gun" and banning it's possession. I only hope you fellow gun owners will stand up for your rights, too. (of course, there would be an exemption for the police (Argh!), since this would disarm well over half of all police in the United States).

However, before the Glock 17 could initially be sold here, it had to be approved for importation into the United States by the Bureau of Alcohol, Tobacco and Firearms (BATF). Glock quickly made the few required changes (mostly additions) to the Glock 17 and the rest, as they say, is history. Having withstood all the bad press and more, Glock is now the fastest selling handgun in the U.S. and the duty weapon most preferred by U.S. law enforcement.

Another source of Glock controversy is their unique "Safe-Action" safety system. I usually get a couple of questions on this a week. Unlike traditional Single or Double Action, Glocks do not have an external manual safety lever, an exposed hammer, or a decocker. Instead, Glock employs three internal safety mechanisms, all activated and deactivated via the trigger, that prevent the gun from firing in the event that the gun is dropped or banged around.

First, the firing pin is not "cocked" unless the trigger is depressed, which compresses the trigger spring. Second, there is a firing pin safety that blocks the movement of the firing pin, so even if the pistol is dropped, inertia cannot cause the pin to strike the primer on a chambered round. Third, Glocks have a trigger safety; a small bar that extends out of the trigger itself. This prevents the trigger from being depressed by inertial forces. Simply put, if the trigger isn't fully pressed, a Glock won't fire.

The firing pin is also referred to as a striker; thus the term "striker- fired", which is how the Glock operates without benefit of any exposed (or concealed) hammer. There is no need for a decocker, either, as the pistol is essentially cocked (or relaxed) by trigger pressure; should the shooter relax the firing finger prior to firing, the firing pin will move to a forward position again without touching the primer. When a design is this simple and works, it's almost human-proof!

Ironically, what were originally attributed as weaknesses in Glock pistols are now known to be strengths. The simple, rugged design of the Glock, including the plastic frame, enabled Glock pistols to survive the most brutal tests against both the elements and normal wear.

Several noted gun writers have put over 125,000 rounds through their personal Glocks (c.f. Chuck Taylor), with one Glock over 1,100,000 rounds, and another over 300,000 +P rounds with no structural failures to date. Glocks have successfully fired when full of water, mud, and sand. Glocks have been frozen in ice, chipped out, and fired. Glocks have been run over (with a primed case chambered) by large tractors, etc. with nothing other than scratched to the surface finish.

Glocks have been dropped from 50 feet with a chambered round and not fired. And, Glocks have proven to be among the most accurate handguns available anywhere right out of the box. Pretty good for an upstart little firm, which has grown considerably as a direct result of their inspired design.

Needless to say, the 9mm Glock Model 17 pistol was selected as the official handgun of the Austrian army. Soon after, the armies of India, Jordan, Thailand, Norway and the Philippines purchased the Glock Model 17. The Glock Model 17 was selected as the official handgun for NATO forces in Europe. The Glock 17 and 19 both have been approved for NATO service, and both have NATO stock numbers.

The Glock Model 17 was the 17th patent that Herr Gaston Glock received. It is a myth that it was so named because 1) It was the 17th version of the Glock pistol that won acceptance by the Austrian army, or 2) because the magazine holds 17 rounds of ammunition.

What some have referred to as "Glockomania" struck law enforcement and the rest of the country followed almost immediately. Armed with a tremendous amount of publicity and controversy surrounding the Glock pistol, Glock, Inc.'s law enforcement sales team, at that time led by Robert Gates, were very successful at selling their Glocks to the Law Enforcement market. Ray Reynolds was also instrumental in Glock's success story.

With all of their success, Glock has continued to evolve a better product and has also diversified their product line. Glock has to date created a total of fourteen models of Glock handguns, to include the full size 17 and 22, the competition 17L and 24/24C, the awesome 18, the compact 19, 23, and 25, the full sized big bore 20 & 21, the subcompacts 26, 27, & 28, and the compact big bore 29 & 30. The 29 should be out sometime in May of 1997.

Another thread that often seems to crop up on the Glock-L mailing list, the Usenet news group rec.guns, and even the many local ranges is the often exaggerated subject of "them Glocks a blowin' up!" Net parlance, I believe may have been coined by the gun writer Dean Speir, refers to this as a "kB!" (shorthand for kaBOOM!), a destructive explosion inside a firearm due to metal fatigue and excessive barrel pressure, usually caused by high or over pressure loads. This is the written representation of what happens when one has a catastrophic explosive event in one's firearm. A full explanation of some of these beliefs is in the Glock kB! FAQ (Frequently Asked Questions).

Occasionally I'm asked what else Glock makes besides their pistols. They also make the following items: Knives (both saw-back and plain), Austrian Army web belts, an entrenching tool, the Armorer's tool, a Flashlight Mount, the Glock sight adjustment tool, the magazine loader (that comes with each new Glock pistol

sold), special orange training magazines (the magazines used to have an orange body, but now have only an orange baseplate), and the 17-T blowback training pistol for Simunition loads (it's considered a firearm like a normal 17). The 17-T frame is blue polymer.

The latter two are only available from Glock for Law Enforcement agencies. The magazines are designed for ready indication of whether or not a magazine is loaded in the Glock, and also to segregate these often harshly treated magazines (and to relegate them strictly to range duty). The 17-T can fire either special rubber training rounds or the popular Simunition 8mm loads (a bottle necked cartridge with a 9mm case necking down to an 8mm projectile, similar to a paint ball round, that's guaranteed to leave a welt on skin). Simunition loads are also normally only sold to Law Enforcement, and are somewhat expensive anyway.

Another oft asked question is "what kind of ammo do you carry in your Glock?" or "What's the best ammo for Glocks?" The first possibly has no relevance to your particular situation, and the second is like "What's the best kind of automobile?" Well, what do you want to do with it, and under what circumstances?

I consider the best type of ammunition for your Glock to be a personal matter. Glock's sole advice is to use only "high quality commercially manufactured ammunition, in excellent condition and in the original caliber of your Glock pistol" and that usually means ammunition manufactured to SAAMI or NATO specs. Note there are currently only NATO specs for 9mm ammunition, at least as far as the Glock pistol calibers are concerned.

To attempt to answer the question in all cases, find one that feeds with reliability. I consider this the most important aspect of any semi-automatic firearm ammunition. For defense, whatever modern hollow point is legal (and feeds 100%; see #1!) will probably work, as I believe the three most important aspects of the mythical "stopping power" are shot placement, shot placement, and (you guessed it) shot placement.

That doesn't mean that I don't test my ammunition for flash, consistency, accuracy, reliability, etc. It does mean I personally discount all of the "exotics" (Glaser, Magsafe, etc.) How can I cycle my off duty / carry ammo every few months if it costs me maybe 100 rounds of ammo to do it? With a low price for the exotics being maybe $2 per round, this simply isn't feasible for most of us. Nor will (or can) the average person try enough of the ammo in their pistol to assure proper feeding, sight in, etc.

Another oft asked question is whether or not it's safe to dry fire a Glock? When fully assembled, the Glock is one of the few pistols available specifically designed to be dry-fired. How else would you be able to field-strip your Glock? :) Remember, Glocks must be completely unloaded first, then pointed in a safe direction and the trigger must be pressed completely to the rear in order to disassemble.

Also, by dry firing, I have found that all of my Glock triggers got smoother over the years as well; an additional side benefit!

For information pertaining to GSSF (the Glock Sports Shooting Foundation) I will refer you to two very detailed sources:

Glock's official GSSF page is here, but Mike Sumner's Unofficial GSSF page is currently even more informative than the official page! You can join the GSSF at Glocks official page. Luckily, GSSF is geared towards safe use of Glocks and "non-racegun" type friendly competition with them.

83 percent of the Glock 17's mass is metal; the remaining 17 percent is polymer. The Glock pistol slide rides on four super hardened metal rails.

The slide on Glock pistols can physically only come off of the pistol towards the muzzle.

The original Glock magazines were purposely designed to -not- drop free during reloading so that they would be

removed by hand and not lost on the battlefield during combat (remember, this pistol was designed for military duty). The American market wanted drop free magazines, so they were created for us. Now, there are no more of the older design for sale in the USA.

The polymer frame is completely solid and functional from negative 65 degrees to 400 degrees Fahrenheit. (Note : If the pistol isn't operable, you won't be either! Ed.)

The lines on the breech face are created when the breach face is broach cut and formed. Glock found it did not affect function in any way, so the breech face was never polished out by hand (which would add to the cost of the pistol).

The Glock 9mm models 17 and 19 have only 33 parts, the other pistols have 34 (they add a reinforcing pin through the locking block). This is less than half the number of components versus most comparable duty pistols. Fewer parts means fewer things to go wrong, everything else being equal. This follows my premise of "**K**eep **I**t **S**imple, **S**tupid!"

It takes approximately 80 seconds to injection mold the lower receiver of a Glock pistol. It takes approximately 8 hours for a single billet of carbon steel to be made into a Glock slide by a CNC machine.

All Glocks come into the US and are distributed there via Glock, Inc. in Smyrna, GA. (Nice folks, BTW -Ed.) They are all shipped with different triggers (all are grooved "target" triggers) and a different "flimsier than even the factory adjustable sight" (the so called "weekend" sight) that was designed by Herr Glock over a weekend for import purposes to get around ATF's point system, enacted in the USA in 1968.

*22. Conclusions / How to contact the Author

I've found the Glock to be an excellent pistol. I've carried one every day for many years now and trust it with my life. I've found it to be a worthy companion. If you have any questions or comments, I'd be glad to try to answer any questions and reply to any comments. If I can't answer your question, you can contact Glock or your nearest Glock field representative.

The quickest, easiest, and best way to contact me is by Internet Email at one of the following (listed in order of preference):

<john@soon.com>
<jmleveron@hotmail.com> (this one will take weeks for me to read)

Snail Mail (a distant second choice) is available via:

```
        John Leveron
        P.O. Box 105323
        Jefferson City, MO
        65110-5323 U.S.A.
```

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    Please include a self addressed stamped envelope if you want a

    return reply due to the mailing costs for replies.


    The KATN BBS (now shut down, please discontinue calling)

    [573] 896-9309 (area code changed from 314 to 573 in July of 1996)

    we were up 24 hours a day, 365 days a year :) for many years
```

```
    USR 33.6 modem
```

I used to run The KATN BBS, which was located in Holts Summit, MO. It was a free access electronic Bulletin Board System dedicated to the right (of the average citizen) to keep and bear arms. Access and file privileges were granted on the first call, with anonymous login available.

John Leveron was (until late 1996) a full time Police Officer. He is a Factory Certified Glock and Beretta Armorer. He served as the primary firearms instructor for his Police Department. He is currently a reserve Deputy Sheriff. His hobbies include camping, shooting, online computing, programming, and reloading. Many files related to his interests were on his BBS. Many were transferred over to Frugal Squirrels homepage (it's listed in my links section).

*23. Addresses / Phone Numbers; How to contact Glock, Inc.

Again, please bear in mind that Glock is not responsible for this document. Glock may, however, be contacted for questions or comments about their pistols. Glock may be reached as follows:

```
(In the U.S.A. , Canada)

Glock, Inc.

6000 Highlands Parkway S.E.

Smyrna, Georgia 30082-7204  USA

(or P.O. Box 369, Smyrna, GA 30081-0369 USA)

Telephone (770) 432-1202

Fax       (770) 433-8719

Telex     543353 glock atl ud

(In Europe, Africa, Middle East)

Glock Ges.m.b.H.

P.O. Box 50

A-2232 Deutsch-Wagram, Austria

Telephone (43) 2247-2460

Fax       (43) 2247-2460/12

Telex     133 307 glock a


(In Asia, Australia)


Glock (H.K.) Ltd.

No. 1, Ma Wor Road, Tai Po

New Territories, Hong Kong

Telephone (852) 657-2868
```

Fax (852) 654-7089

(In Latin America, Central America, Caribbean)

Glock America N.V.

International Trade Center

P.O. Box 62.28

Curacao, Netherlands Antilles

Telephone (599-9) 636201,636202

Fax (599-9) 636526

(In France)

Glock France S.A.

50, Avenue Victor Hugo

F-92500 Rueil Malmaison

France

Telephone (33) 1 47 .49.86.03

Fax (33) 1 47 .49.74.17

*24. Special Thanks

I would like to thank Glock for their generous assistance with this project and for providing certain technical information. I would also like to thank them for creating such a fine pistol.

Thanks also goes to Jack D'Orazi, who originally converted the UGUM into .html format and put it on the web. He also originally hosted my web page (the UGUM was once located on his server!).

I'm sure I've missed some people. Email me and let me know! Such things are important, too.

John Leveron,
(former Sysop, The KATN BBS)

Last updated: Sunday, April 13, 1997

.html version originally coded by Jack D'Orazi

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HEADQUARTERS
DEPARTMENT OF THE ARMY

FM 23-30

GRENADES AND PYROTECHNIC SIGNALS

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.

PREFACE

The purpose of this manual is to orient soldiers to the functions and descriptions of hand grenades and ground pyrotechnic signals. It provides a reference for the identification and capabilities of various hand grenades and pyrotechnic signals. It also provides a guide for the proper handling and throwing of hand grenades, suggests methods and techniques for the tactical employment of hand grenades, and provides a guide for commanders conducting hand grenade training.

This manual provides information and guidance for operating, using, and training with hand grenades. It is intended for two user groups: (1) *training centers* responsible for introducing and training soldiers to a basic knowledge level and (2) *field units, officers,* and *noncommissioned officers* responsible for sustaining basic knowledge level skills and advancing soldier skills in the employment of the hand grenades on the battlefield.

The development of new hand grenades and improvement of existing hand grenades has resulted in many different grenade types within the US inventory. While only a limited number of grenade types are in production today for US Armed Forces, the majority of all hand grenades produced are used by either the armed forces of our allies or countries to which we occasionally provide military assistance. This manual addresses hand grenades common to the US Army. Obsolete hand grenades (the hand grenades less likely to be issued to US Army personnel) are addressed in Appendix E.

The proponent of this publication is Headquarters, TRADOC. Send comments and recommendations on DA Form 2028 directly to Commandant, US Army Infantry School, ATTN: ATSH-IN-S3, Fort Benning, GA 31905-5596; email LusanoH@benning.army.mil.

Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

FIELD MANUAL
NO. 3-23.30

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 1 September 2000

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CHAPTER 1

TYPES OF HAND GRENADES

This chapter describes the various types of hand grenades, their components and mechanical functions, and examples of the grenades used by US forces.

1-1. DESCRIPTION

The hand grenade is a handheld, hand-armed, and hand-thrown weapon. US forces use colored smoke, white smoke, riot-control, special purpose, offensive, and practice hand grenades. Each grenade has a different capability that provides the soldier with a variety of options to successfully complete any given mission. Hand grenades give the soldier the ability to kill enemy soldiers and destroy enemy equipment. Historically, the most important hand grenade has been the fragmentation grenade, which is the soldier's personal indirect weapon system. Offensive grenades are much less lethal than fragmentation grenades on an enemy in the open, but they are very effective against an enemy within a confined space. Smoke and special purpose grenades can be used to signal, screen, control crowds or riots, start fires, or destroy equipment. The hand grenade is thrown by hand; therefore, the range is short and the casualty radius is small. The 4- to5-second delay on the fuze allows the soldier to safely employ the grenade.

1-2. COMPONENTS

The hand grenade is made up of the following components:

a. **Body**. The body contains filler and, in certain grenades, fragmentation.

b. **Filler**. The filler is composed of a chemical or explosive substance, which determines the type of hand grenade for employment factors.

c. **Fuze Assembly**. The fuze causes the grenade to ignite or explode by detonating the filler.

1-3. MECHANICAL FUNCTION

The following is the sequence for the M67 fragmentation hand grenade safety clip insertion and arming.

a. **Insert the Safety Clip**. All hand grenades do not have safety clips (NSN 1330-00-183-5996). However, safety clips are available through Class V ammunition supply channels for some types of grenades. The safety clip is adaptable to the M26 and M67 series, the MK2, and the M69 practice grenade. The safety clip prevents the safety lever from springing loose even if the safety pin assembly is accidentally removed. The adjustment instructions are illustrated in Figure 1-1. The safety clip installation instructions are as follows:

(1) Hold the fuzed grenade in the palm of the hand with the pull ring up.

(2) Insert the small loop at the open end of the safety clip in the slot of the fuze body beneath the safety lever.

(3) Press the clip across the safety lever until the closed end of the clip touches the safety lever and snaps securely into place around the safety lever.

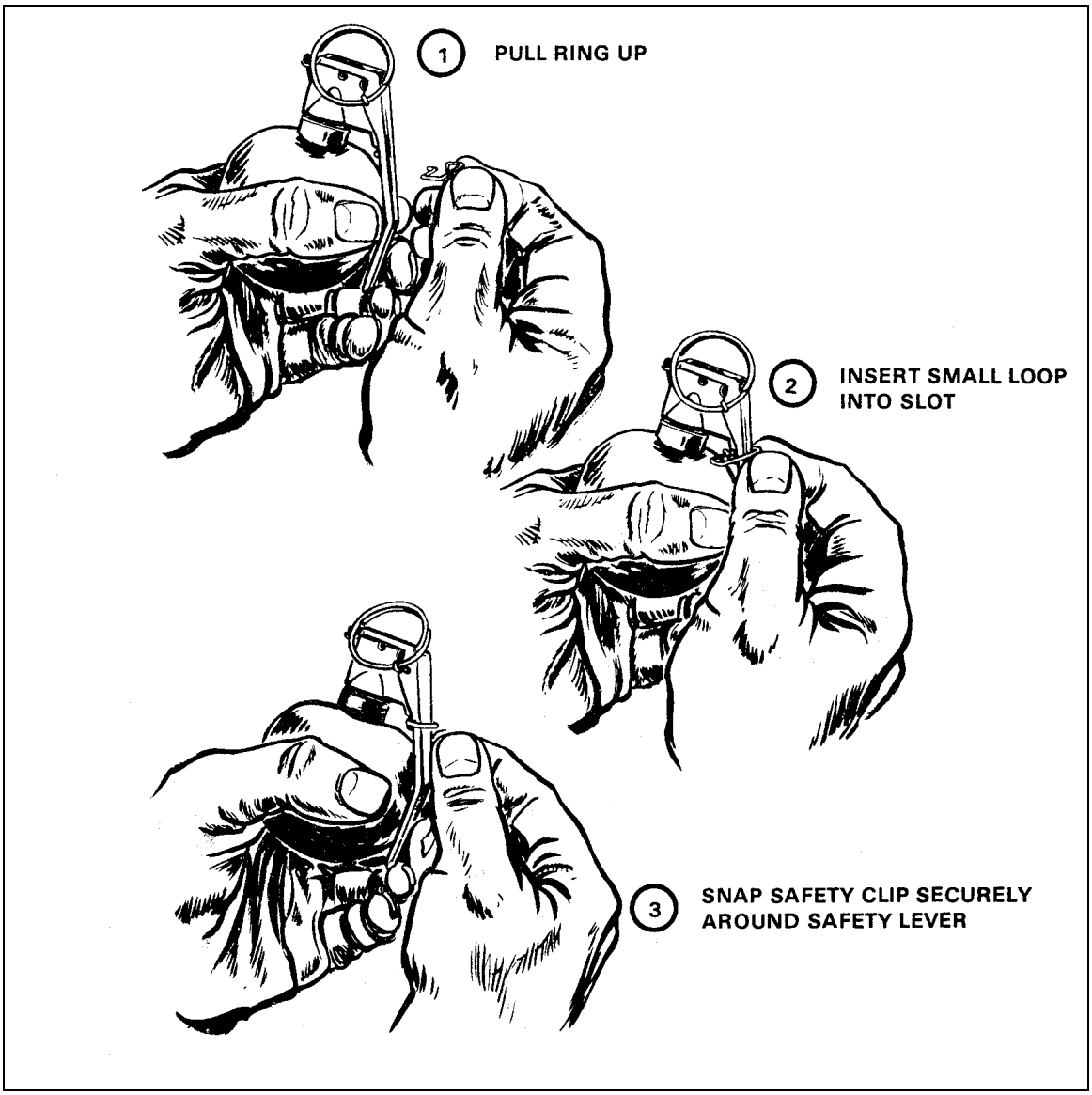


Figure 1-1. Safety clip insertion.

b. **Arming Sequence**. First remove the safety clip, then the safety pin, from the fuze by pulling the pull ring. Be sure to maintain pressure on the safety lever: it springs free once the safety clip and the safety pin assembly are removed.

c. **Release Pressure on Lever**. Once the grenade is thrown, the pressure on the safety lever is released, and the striker is forced to rotate on its axis by the striker spring, throwing the safety lever off. The striker then detonates the primer, and the primer explodes and ignites the delay element. The delay element burns for the prescribed amount of time then activates either the detonator or the igniter. The detonator or igniter acts to either explode or burn the filler substance (Figure 1-2).

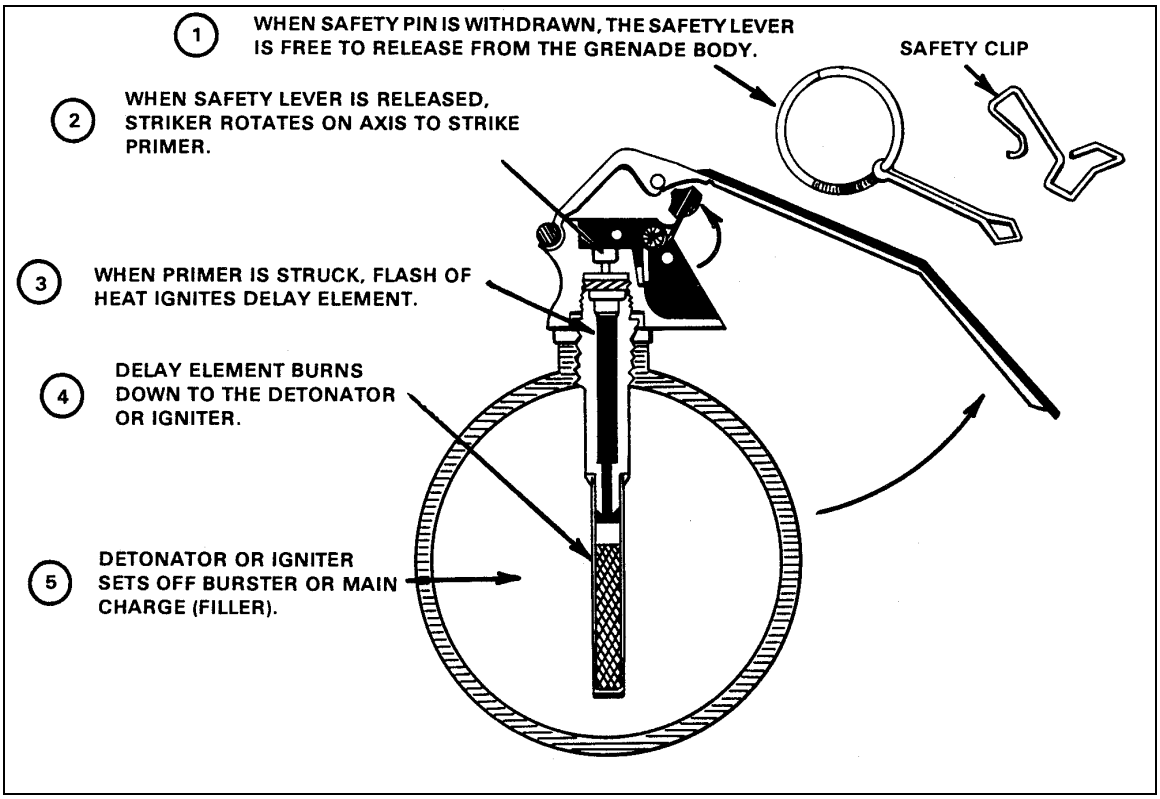

1
WHEN SAFETY PIN IS WITHDRAWN, THE SAFETY LEVER IS FREE TO RELEASE FROM THE GRENADE BODY.
SAFETY CLIP
2
WHEN SAFETY LEVER IS RELEASED, STRIKER ROTATES ON AXIS TO STRIKE PRIMER.
3
WHEN PRIMER IS STRUCK, FLASH OF HEAT IGNITES DELAY ELEMENT.
4
DELAY ELEMENT BURNS DOWN TO THE DETONATOR OR IGNITER.
5
DETONATOR OR IGNITER SETS OFF BURSTER OR MAIN CHARGE (FILLER).

Figure 1-2. Fuze functioning.

1-4. FUZES

The two types of fuzes used in current US hand grenades are detonating and ignition. Both function in the same manner; the difference is how they activate the filler substance.

a. **Detonating Fuze**. Detonating fuzes explode within the grenade body to initiate the main explosion of the filler substance. Detonating fuzes include the M213 and M228.

(1) *M213 fuze*. The M213 fuze (Figure 1-3) is designed for use with the M67 fragmentation grenade. It has a safety clip. The standard delay element is a powder train requiring 4 to 5 seconds to burn to the detonator. In some cases, the delay element may vary from less than 4 seconds to more than 5 seconds due to defective fuzes.

WARNING

If pressure on the safety lever is relaxed after the safety clip and safety pin have been removed, it is possible that the striker can rotate and strike the primer while the thrower is still holding the grenade. This is called "milking" the grenade. Throwers must be instructed to maintain enough pressure on the safety lever so the striker cannot rotate.

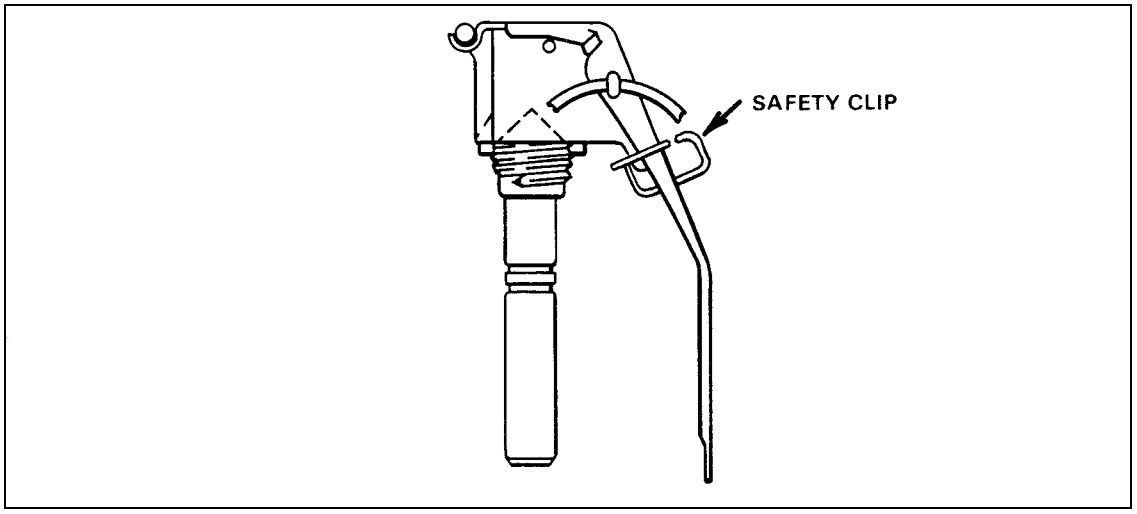


Figure 1-3. M213 fuze.

(2) *M228 fuze*. The M228 fuze (Figure 1-4) is used with the M69 practice grenade to replicate the fuze delay of the M67 fragmentation hand grenade. The time delay element is a powder train with a 4- to 5-second delay burn. In some cases, however, the delay element may vary from less than 4 seconds to more than 5 seconds due to defective fuzes.

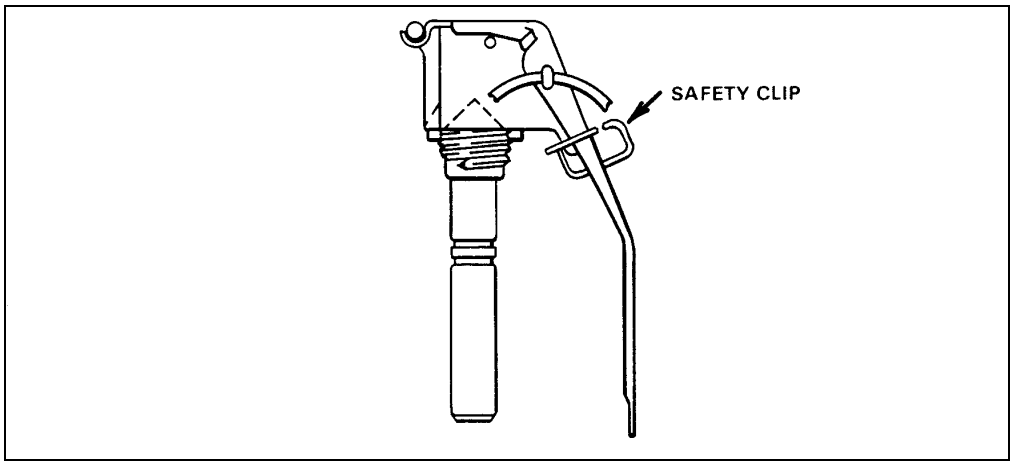


Figure 1-4. M228 fuze.

b. **Igniting Fuze**. Igniting fuzes are designed for use with chemical hand grenades. They burn at high temperatures and ignite the chemical filler. The M201A1 (Figure 1-5) is designed for use with the AN-M83HC white smoke grenade, the AN-M14 TH3 incendiary grenade, and the M18 colored smoke grenade. This fuze is interchangeable with any standard firing device. The time delay element is a powder train requiring 1.2 to 2 seconds to burn to the igniter. The igniter ignites the filler or a pyrotechnic starter with a violent burning action and expels the filler from the grenade body.

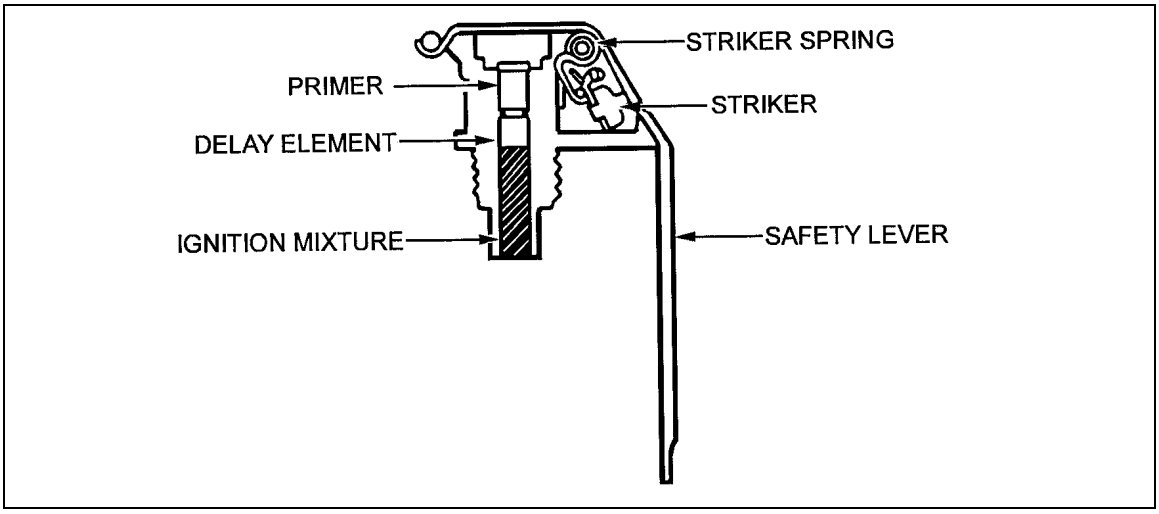


Figure 1-5. M201A1 fuze.

1-5. FRAGMENTATION HAND GRENADES

The following is a description of the M67 fragmentation hand grenade (Figure 1-6):

a. **Body**. The body is a steel sphere.

b. **Filler**. The filler has 6.5 ounces of Composition B.

c. **Fuze**. The fuze is an M213.

d. **Weight**. The grenade weighs 14 ounces.

e. **Safety Clip**. The grenade has a safety clip. (See paragraph 1-3.)

f. **Capabilities**. The average soldier can throw the M67 grenade 35 meters effectively. The effective casualty-producing radius is 15 meters and the killing radius is 5 meters.

g. **Color and Markings**. The grenade has an olive drab body with a single-yellow band at the top. Markings are in yellow.

WARNING

Although the killing radius of this grenade is 5 meters and the casualty-producing radius is 15 meters, fragmentation can disperse as far away as 230 meters.

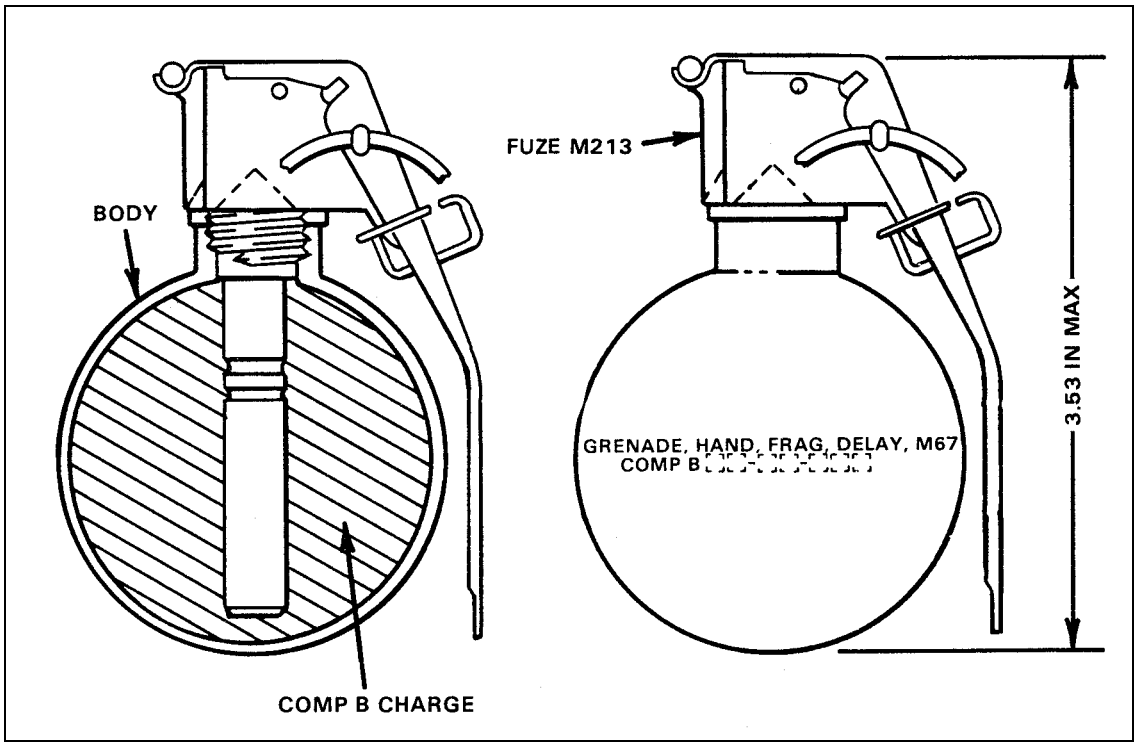


Figure 1-6. M67 fragmentation hand grenade.

1-6. SMOKE HAND GRENADES

Smoke hand grenades are used as ground-to-ground or ground-to-air signaling devices, target or landing zone marking devices, or screening devices for unit movements.

a. **M18 Colored Smoke Hand Grenade**. The following is a description of the M18 colored smoke hand grenade and its components (Figure 1-7).

(1) *Body*. The body has a sheet steel cylinder with four emission holes at the top and one at the bottom. The holes allow smoke to escape when the grenade is ignited.

(2) *Filler*. The filler has 11.5 ounces of colored smoke mixture (red, yellow, green and violet).

(3) *Fuze*. The fuze is an M201A1.

(4) *Weight*. The grenade weighs 19 ounces.

(5) *Safety clip*. This grenade does not have a safety clip.

(6) *Capabilities*. The average soldier can throw this grenade 35 meters. It produces a cloud of colored smoke for 50 to 90 seconds.

(7) *Color and markings*. The grenade has an olive drab body with the top indicating the smoke color.

(8) *Field expedient*. In combat, you may need to use the M18 hand grenade without the fuze. Use the following procedures *in combat only*:

- Remove the tape from the grenade bottom to expose the filler.
- Remove the fuze by unscrewing it from the grenade.
- Ignite the starter mixture with an open flame.
- Throw the grenade immediately to avoid burn injury.

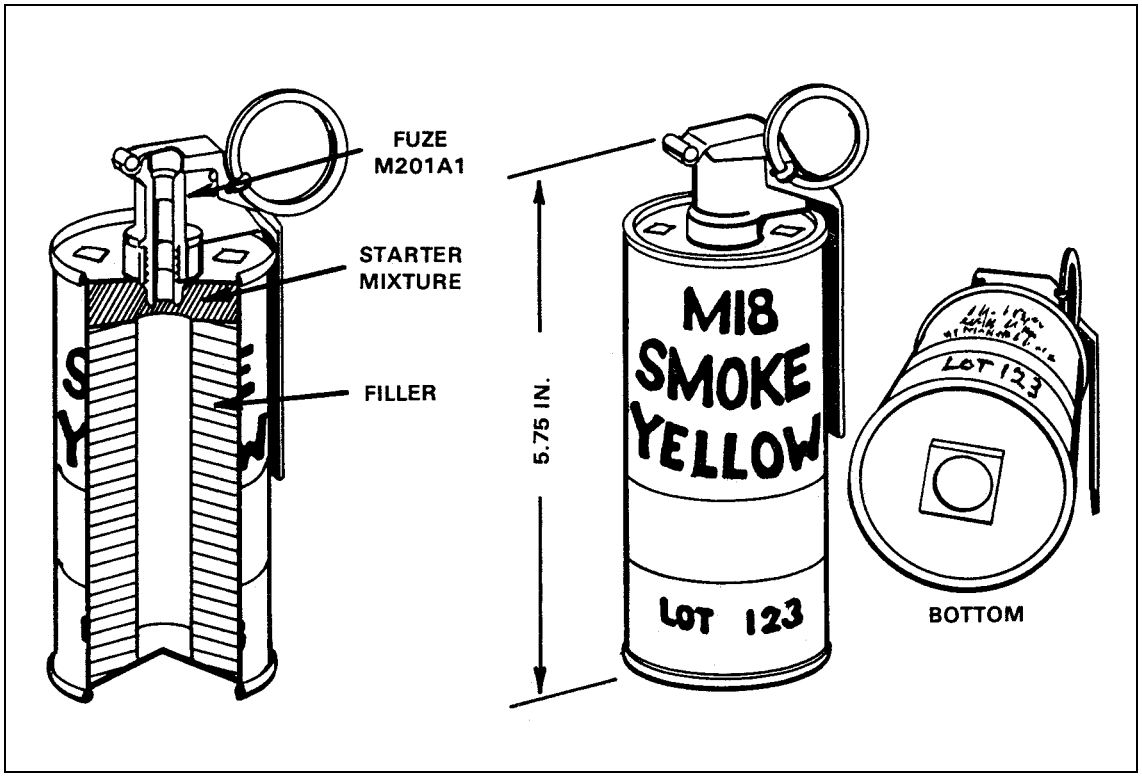


Figure 1-7. M18 colored smoke hand grenade.

WARNING

Do not use a smoke grenade in an enclosed area. If you must remain in the area with the smoke, always wear a protective mask.

b. **AN-M83 HC White Smoke Hand Grenade**. The AN-M83 HC white smoke hand grenade (Figure 1-8) is used for screening the activities of small units and for ground-to-air signaling.

(1) *Body*. The body is a cylinder of thin sheet metal, 2.5 inches in diameter.

(2) *Filler*. The filler has 11 ounces of terephthalic acid.

(3) *Fuze*. The fuze is an M201A1.

(4) *Weight*. The grenade weighs 16 ounces and is 2.5 inches in diameter and 5.7 inches in length.

(5) *Safety clip*. This grenade does not have a safety clip.

(6) *Capabilities*. The AN-M83 produces a cloud of white smoke for 25 to 70 seconds.

(7) *Color and markings*. The grenade has a forest green body with light green markings, a blue band, and a white top.

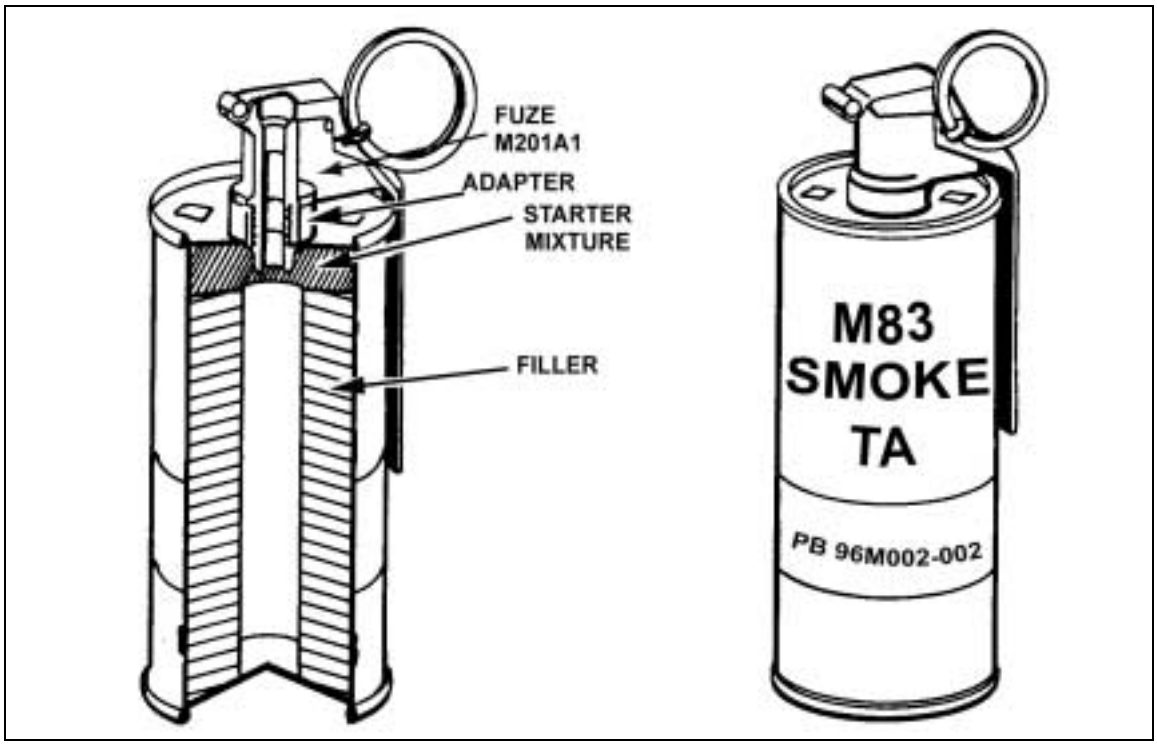


Figure 1-8. AN-M83 white smoke hand grenade.

1-7. RIOT-CONTROL HAND GRENADES

The ABC-M7A2 and ABC-M7A3 riot-control hand grenades (Figure 1-9) contain only CS as a filler. They differ only in the amount of filler and the form of the CS they contain. Description and components are as follows:

a. **Body**. The bodies of both grenades are sheet metal with four emission holes at the top and one at the bottom.

b. **Filler**. The ABC-7A2 grenade has 5.5 ounces of burning mixture and 3.5 ounces of CS in gelatin capsules. The ABC-M7A3 has 7.5 ounces of burning mixture and 4.5 ounces of pelletized CS agent.

c. **Fuze**. The fuze for either grenade is an M201A1.

d. **Weight**. Each grenade weighs about 15.5 ounces.

e. **Safety**. These grenades do not have safety clips.

f. **Capabilities**. The average soldier can throw these grenades 40 meters. Both grenades produce a cloud of irritant agent for 15 to 35 seconds.

g. **Color and Markings**. Both grenades have gray bodies with red bands and markings.

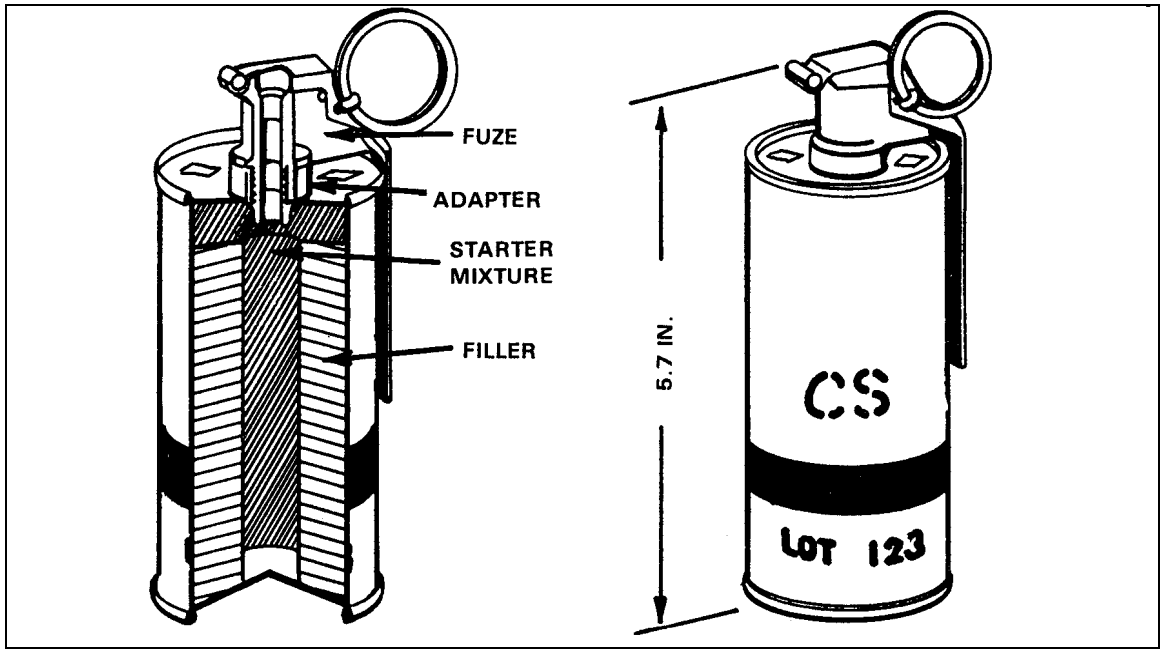


Figure 1-9. ABC-M7A2 and M7A3 riot-control hand grenades.

WARNING

Do not use a riot control grenade in an enclosed area. If you must remain in the area, always wear a protective mask.

1-8. SPECIAL-PURPOSE HAND GRENADES

a. **Incendiary**. The AN-M14 TH3 incendiary hand grenade (Figure 1-10) is used to destroy equipment or start fires. It can also damage, immobilize, or destroy vehicles, weapons systems, shelters, or munitions. The description and components are as follows:

(1) *Body*. The body is sheet metal.

(2) *Filler*. The filler has 26.5 ounces of thermate (TH3) mixture.

(3) *Fuze*. The fuze is an M201A1.

(4) *Weight*. The grenade weighs 32 ounces.

(5) *Safety clip*. This grenade does not have a safety clip.

(6) *Capabilities*. The average soldier can throw this grenade 25 meters. A portion of thermate mixture is converted to molten iron, which burns at 4,000 degrees Fahrenheit. The mixture fuzes together the metallic parts of any object that it contacts. Thermate is an improved version of thermite, the incendiary agent used in hand grenades during World War II. The thermate filler can burn through a 1/2-inch homogenous steel plate. It produces its own oxygen and burns under water.

(7) *Color and markings*. The grenade is gray in color with purple markings and a single purple band (current grenades). Under the standard color-coding system, incendiary grenades are light red with black markings.

WARNING

Avoid looking directly at the incendiary hand grenade as it burns. The intensity of the light is hazardous to the retina and can cause permanent eye damage.

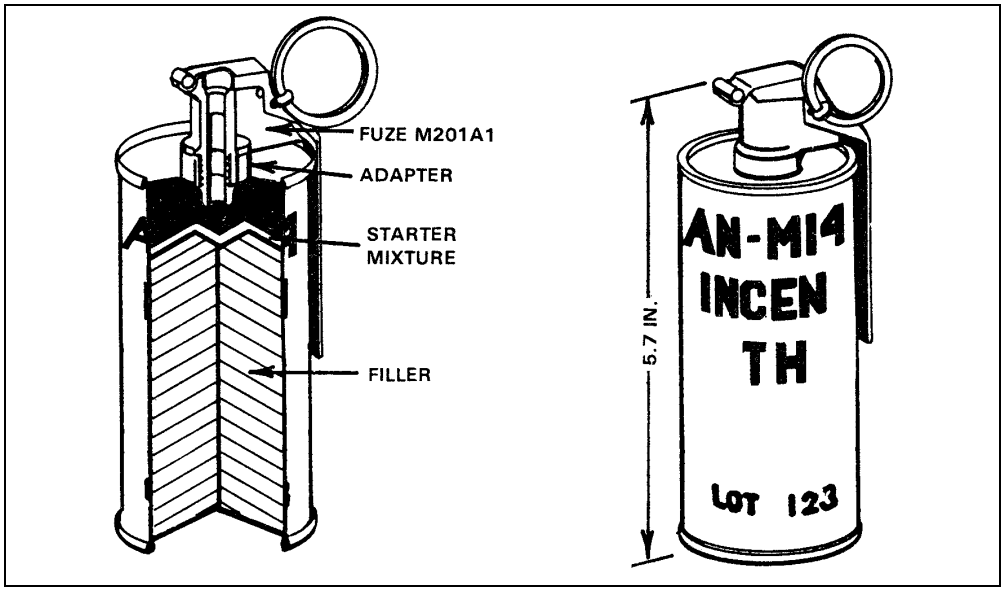


Figure 1-10. AN-M14 TH3 incendiary hand grenade.

b. **Offensive**. The MK3A2 offensive hand grenade (Figure 1-11), commonly referred to as the concussion grenade, is designed to produce casualties during close combat while minimizing danger to friendly personnel. The grenade is also used for concussion effects in enclosed areas, for blasting, and for demolition tasks. The shock waves (overpressure) produced by this grenade when used in enclosed areas are greater than those produced by the fragmentation grenade. It is, therefore, very effective against enemy soldiers located in bunkers, buildings, and fortified areas.

(1) *Body*. The body is fiber (similar to the packing container for the fragmentation grenade.)

(2) *Filler*. The filler has 8 ounces of TNT.

(3) *Fuze*. The fuze is an M206A1 or M206A2 (see paragraph 1-4).

(4) *Weight*. The grenade weighs 15.6 ounces.

(5) *Safety clip*. The MK3A2 may be issued with or without a safety clip (see paragraph 1-3).

(6) *Capabilities.* The average soldier can throw this grenade 40 meters. It has an effective casualty radius of 2 meters in open areas, but secondary missiles and bits of fuze may be projected as far as 200 meters from the detonation point.

(7) *Color and markings*. The grenade is black with yellow markings around its middle.

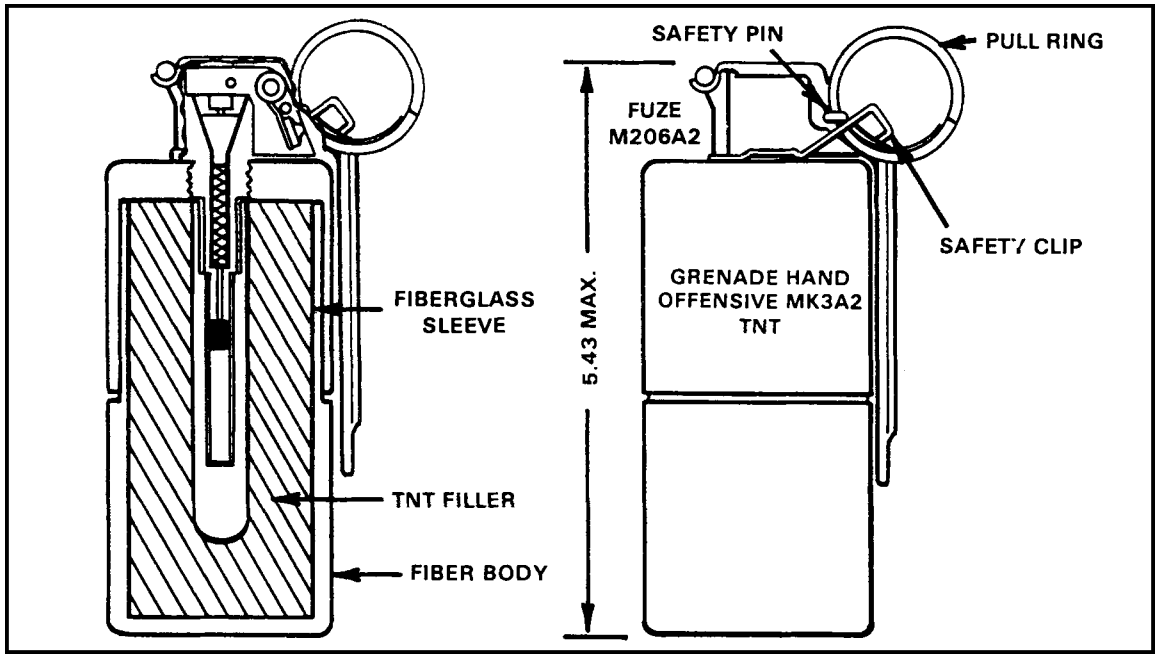


Figure 1-11. MK3A2 offensive grenade.

1-9. PRACTICE HAND GRENADES

The M69 practice hand grenade (Figure 1-12) simulates the M67 series of fragmentation hand grenades for training purposes. The grenade provides realistic training and familiarizes the soldier with the functioning and characteristics of the fragmentation hand grenade. The following is a description of the M69 practice hand grenade and its components:

a. **Body.** The body is a steel sphere.

b. **Fuze**. The fuze is an M228, which is inserted into the grenade body.

c. **Weight**. The grenade weighs 14 ounces.

d. **Safety Clip**. The M69 grenade has a safety clip.

e. **Capabilities**. The average soldier can throw the M69 hand grenade 40 meters. After a delay of 4 to 5 seconds, the M69 emits a small puff of white smoke and makes a loud popping noise. The grenade body can be used repeatedly by replacing the fuze assembly.

f. **Color and Markings**. The grenade is light blue with white markings. The safety lever of the fuze is light blue with black markings and a brown tip.

WARNING

Fuze fragments may exit the hole in the base of the grenade body and cause injuries.

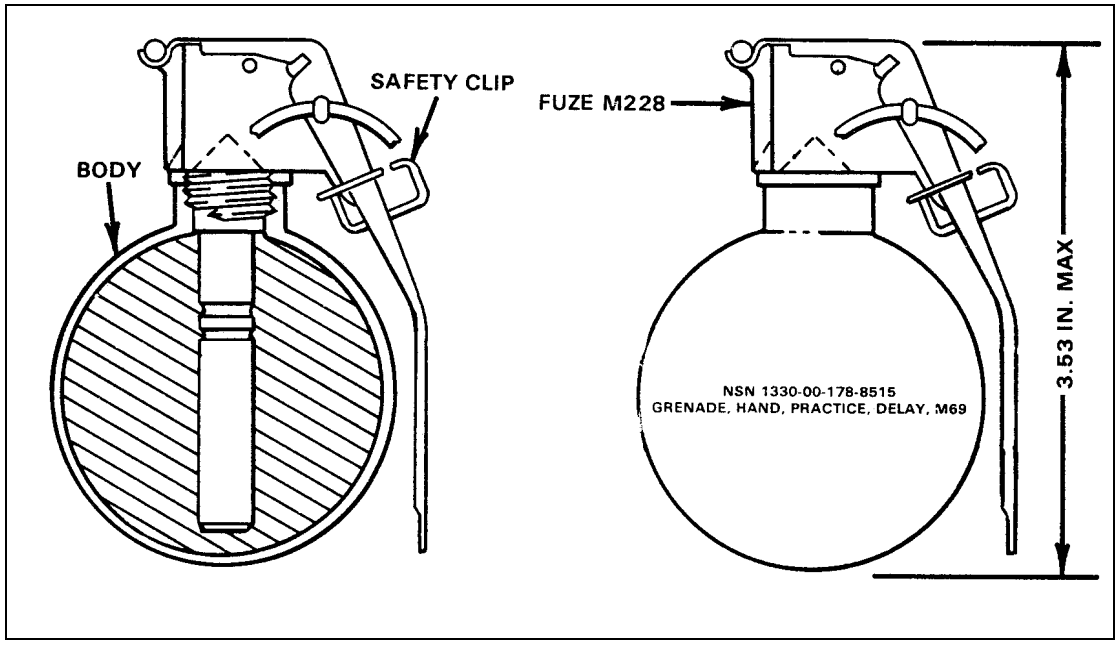


Figure 1-12. M69 practice hand grenade.

1-10. STUN HAND GRENADES

Stun hand grenades are used as diversionary or distraction devices during building and room clearing operations when the presence of noncombatants is likely or expected and the assaulting element is attempting to achieve surprise. The following is a description of the M84 diversionary/flash-bang stun hand grenade and its components (Figure 1-13).

a. **Body**. The body is a steel hexagon tube with holes along the sides to allow for the emission of intense light and sound when the grenade is ignited.

b. **Fuze and safety pin**. The fuze is the M201A1. The M84 also has a secondary safety pin with a triangular pull ring.

c. **Weight**. The grenade weighs 8.33 ounces.

d. **Capabilities**. The handheld device is designed to be thrown into a room (through an open door, a standard glass window, or other opening) where it delivers a loud bang and bright flash sufficient to temporarily disorient personnel in the room.

e. **Field-expedient early warning device**. In combat, you may need to use the M84 stun hand grenade as an early warning device. Use the following procedures in combat only:

(1) Attach the grenade to a secure object such as a tree, post, or picket.

(2) Attach a tripwire to a secure object, extend it across a path, and attach it to the pull ring of the grenade.

(3) Bend the end of the pull pin flat to allow for easy pulling.

(4) Remove the secondary safety pin.

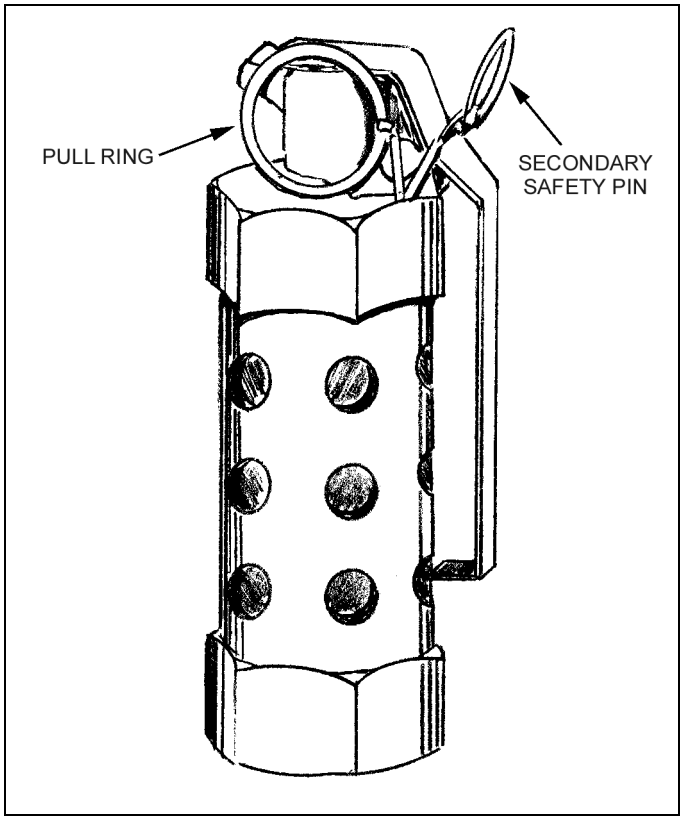


Figure 1-13. M84 stun hand grenade.

CAUTION

Use stun grenades as field-expedient early warning devices only when in a combat environment.

CHAPTER 2
MAINTENANCE

Proper maintenance contributes to a weapon's effectiveness as well as a unit's readiness. This chapter discusses the maintenance aspects of all hand grenades within the US inventory to include inspection, cleaning, lubrication, and maintenance before throwing live or practice hand grenades.

2-1. GENERAL ASSEMBLY

Hand grenades within the US inventory are composed of a body and a fuze. Most hand grenades come assembled with the exception of the M69 practice hand grenade and the fuzes for the M69, which come in flats of 45 fuzes.

2-2. INSPECTION PROCEDURES

Hand grenades within the US inventory are specifically designed and manufactured to overcome any situation during combat or training missions. Grenades can be used to save or take lives. Hand grenades are simple yet powerful weapons used in combat or any training mission. As simple as they may seem, however, hand grenades—like any other weapon—must be inspected before use in order to avoid serious injury or death. The following inspection procedures apply to all hand grenades within the US inventory.

a. **Newly Issued Hand Grenades**.

(1) Remove the tape and the top cover from the shipping canister.

(2) Look down into the canister; if the hand grenade is upside down, return the canister to the issuing person (NCOIC or OIC).

(3) Ensure all required safeties are properly attached to the hand grenade. If a safety pin is missing, return it.

(4) Check the hand grenade for rust on the body or the fuze. If it has rusted, return it.

(5) Check for holes on the body and the fuze. If any holes are visible, return the hand grenade.

(6) If the hand grenade seems to be in order, remove the grenade carefully from the canister and make a visual check for proper fitting of the safety pins. Then, properly secure the grenade to the ammunition pouch.

b. **Grenades That Are Unpacked or Stored on Ammunition Pouches**.

(1) Inspect unpacked grenades daily to ensure safety pins are present. Under hostile conditions, the safety clip must be removed from the fragmentation hand grenade since soldiers under stressful situations sometimes forget to remove the clip when throwing the grenade.

(2) Check the body for rust or dirt.

(3) Make sure the lever is not broken or bent.

2-3. CLEANING, LUBRICATION, AND PREVENTIVE MAINTENANCE

Hand grenades are like any other weapon; they must be inspected and cleaned weekly when exposed to the environment. The body of the hand grenade is made of metal, which rusts when it is exposed to moisture or submerged in water. If not removed, dirt or rust can cause the hand grenade to malfunction.

a. **Cleaning**. Wipe the dirt off the body of the hand grenade using a slightly damp cloth or a light brush. For the fuze head, a light brush is recommended since it can reach into the crevices.

b. **Lubrication**. Depending on weather conditions, a light coat of CLP may be needed.

c. **Preventive Maintenance**. For most hand grenades, keeping them clean and lubricated is sufficient maintenance. With the M69 practice grenade, however, maintenance is more difficult since the bodies are used repeatedly. The M69 practice grenade must be cleaned with a wire brush and painted at least quarterly. The threads must be cleaned with a wire brush on a monthly basis, and fuze residue must be removed from the body immediately after each use. Cleaning the threads and removing the residue from the hand grenade body make replacement of the fuzes easier. The grenade body lasts longer if these preventive maintenance procedures are performed.

CHAPTER 3

EMPLOYMENT OF HAND GRENADES

This chapter addresses the fundamentals that develop a soldier's skill and confidence in hand grenade use. These fundamentals include proper carrying, proper handgrips, and the three basic hand grenade throwing techniques. This chapter explains how effective and versatile the hand grenade is and how easily it can be carried. The tactical employment of hand grenades is limited only by the imagination of the user. With confidence and good training, soldiers can put this small but powerful weapon to good use against enemy forces or in any training environment.

Section I. INTRODUCTION TO HAND GRENADE TRAINING

The rifle, the bayonet, and the hand grenade are the soldier's basic lethal weapons. Historically, hand grenade training has received less emphasis than marksmanship and bayonet training. The hand grenade must receive greater emphasis in training programs and field training exercises. The proper use of hand grenades could determine the fate of the soldier or the success of the mission.

Leaders at all levels should study the employment of grenades in conjunction with the unit mission and implement a training program that supports that mission. Once soldiers can safely arm and throw live fragmentation grenades, units should integrate the use of grenades into collective tasks, rather than training these skills as a separate event. Hand grenades must be integrated with other available weapons systems to enhance the unit's combat power on the modern battlefield. We must conduct hand grenade training in the same manner in which we plan to fight.

We cannot let the danger associated with hand grenades deter our training efforts. Proper control and safety procedures allow us to conduct hand grenade training in a safe manner. Train soldiers to standard, and safety is inherent.

Hand grenades include more than casualty-producing instruments of war. They are used to signal, screen, and control crowds. The current inventory provides a specific hand grenade for most circumstances. Soldiers must be familiar with current grenades, their descriptions, and how best to employ each.

3-1. HAND GRENADE STORING

The storing of hand grenades on ammunition pouches is one of the most neglected aspects of hand grenade training. Experiences of American infantry, both in combat and in training, point out the need for specific training in storing hand grenades on ammunition pouches and integration of this type of training into tactical training exercises. Commanders should make every effort to issue training hand grenades for wear and use during all training activities. The soldier must be as confident in carrying and using hand grenades as he is with his rifle and bayonet. Before storing a hand grenade, take the following safety precautions:

a. Check the grenade fuze assembly for tightness. It must be tightly fitted in the grenade fuze well to prevent the grenade from working loose and separating from the grenade body. Never remove the fuze from a grenade.

b. If the grenade safety lever is broken, do not use the grenade. A broken safety lever denies the thrower the most critical safety mechanism of the grenade.

c. Do not bend the ends of the safety pin back flush against the fuze body. This practice, intended to preclude the accidental pulling of the pin, makes the removal of the safety pin difficult. Repeated working of the safety pin in this manner causes the pin to break, creating a hazardous condition.

d. Carry hand grenades either on the ammunition pouch, using the carrying safety straps that designed specifically for this purpose (Figure 3-1), or in the grenade pockets of the enhanced tactical load-bearing vest (Figure 3-2).

(1) *Standard ammunition pouch*. Open the web carrying sleeve on the side of the ammunition pouch and slide the grenade into the sleeve with the safety lever against the side of the ammunition pouch. Be sure the pull ring is in the downward position. Wrap the carrying strap around the neck of the fuze and snap the carrying strap to the carrying sleeve.

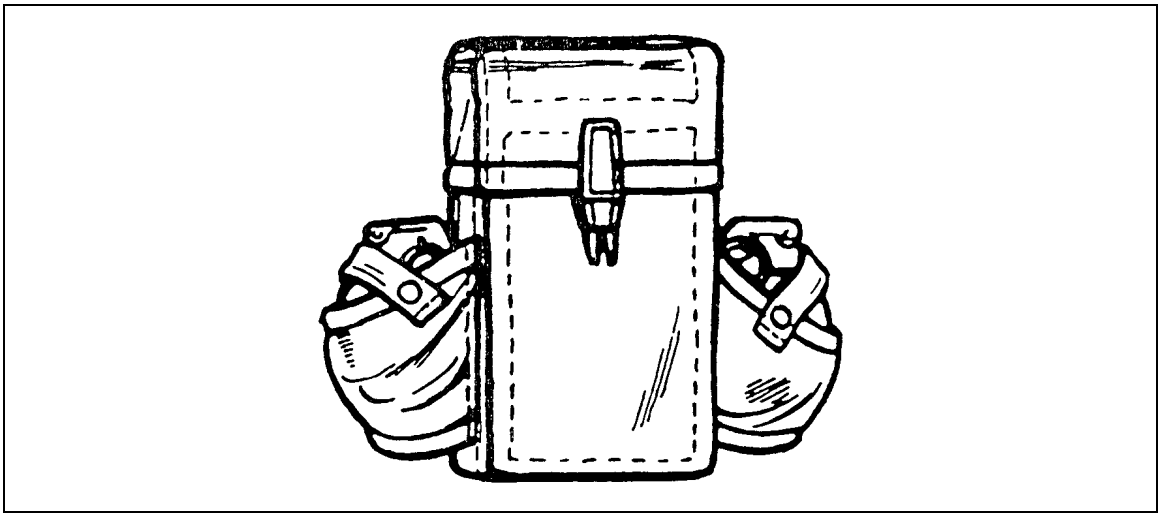


Figure 3-1. Standard ammunition pouch.

(2) *Enhanced tactical load-bearing vest*. The enhanced tactical load-bearing vest (ETLBV) has slanted pockets for carrying hand grenades. The grenades are not exposed and are safer to carry than in the standard ammunition pouch. The ETLBV is intended to provide the combat soldier with a comfortable and efficient method of transporting the individual fighting load.

- **Description**. The ETLBV has permanently attached ammunition and grenade pockets. The vest is compatible with the standard equipment belt. It incorporates adjustments to allow for proper fitting.
- **Components materials**. The ETLBV has 7 yards and 5 ounces of nylon fabric and nylon webbing.
- **Color**. The coloring of the ETLBV is woodland camouflage.
- **Weight**. The ETLBV weighs 1.9 pounds.

- **Size**. The ETLBV comes in one size that fits all.
- **Basis of issue**. Each infantry soldier should receive one ETLBV.

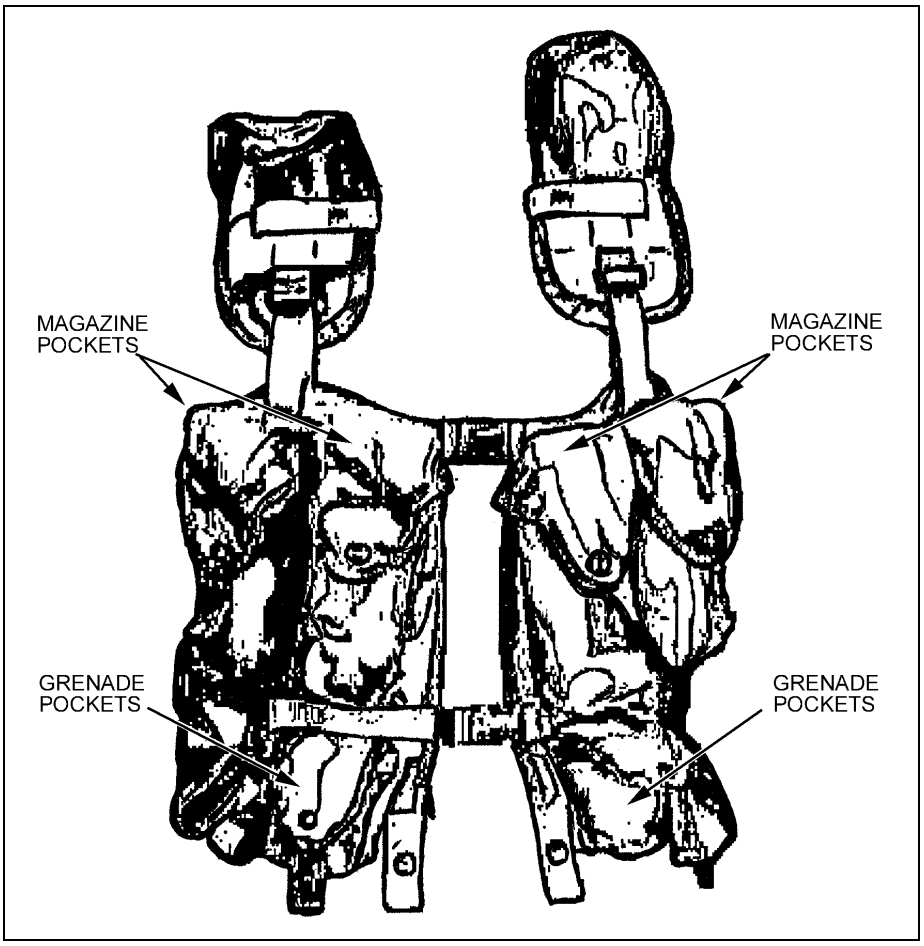


Figure 3-2. Enhanced tactical load-bearing vest.

3-2. HAND GRENADE GRIPPING PROCEDURES

The importance of properly gripping the hand grenade cannot be overemphasized. Soldiers must understand that a grenade not held properly is difficult to arm. Sustainment training is the key to maintaining grip efficiency. Gripping procedures differ slightly for right- and left-handed soldiers:

a. Holding the grenade in the throwing hand with the safety lever placed between the first and second joints of the thumb provides safety and throwing efficiency.

b. Right-handed soldiers hold the grenade upright with the pull ring away from the palm of the throwing hand so that the pull ring can be easily removed by the index or middle finger of the free hand (Figure 3-3).

c. Left-handed soldiers invert the grenade with the fingers and thumb of the throwing hand positioned in the same manner as by right-handed personnel (Figure 3-4).

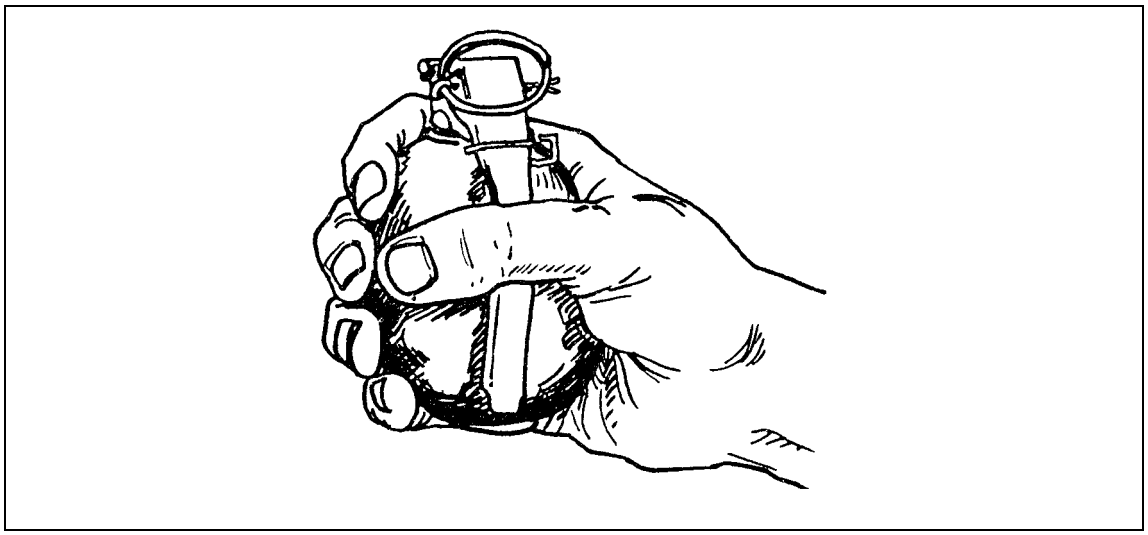


Figure 3-3. Right-handed grip.

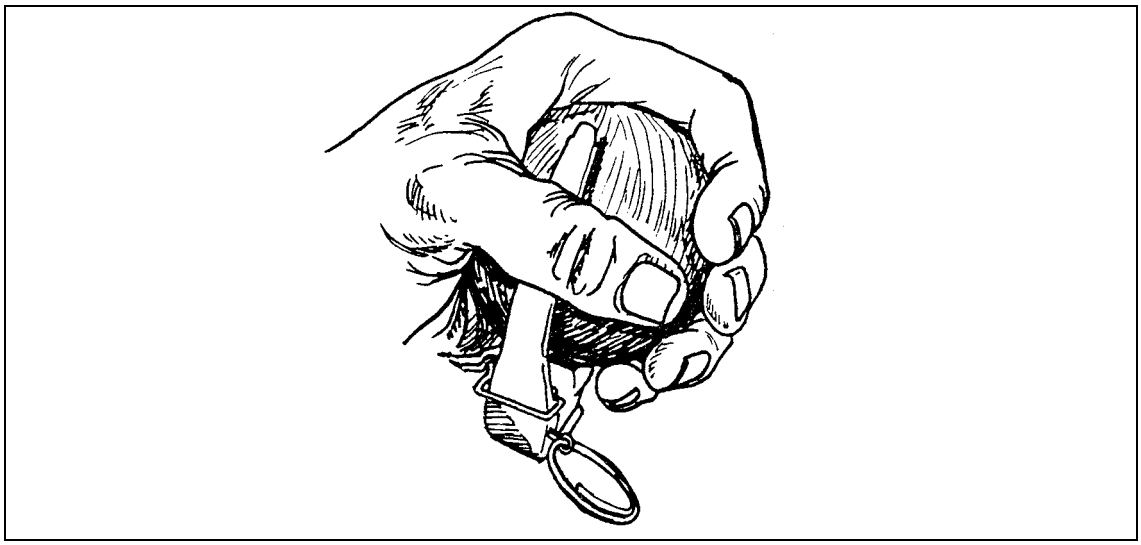


Figure 3-4. Left-handed grip.

3-3. HAND GRENADE THROWING

Since few soldiers throw in the same manner, it is difficult to establish firm rules or techniques for throwing hand grenades. How accurately they are thrown is more important than how they are thrown. If a soldier can achieve more distance and accuracy using his own personal style, he should be allowed to do so as long as his body is facing sideways, towards the enemy's position, and he throws basically overhand. There is, however, a recommended method of throwing hand grenades.

a. **Employ Grenades**. Use the following procedures:

(1) Observe the target to mentally establish the distance between your throwing position and the target area. In observing the target, minimize your exposure time to the enemy (no more than 3 seconds).

(2) Grip the hand grenade in your throwing hand.

(3) Grasp the pull ring with the index or middle finger of your nonthrowing hand. Remove the safety pin with a pulling and twisting motion. If the tactical situation permits, observe the safety pin's removal.

(4) Look at the target and throw the grenade using the overhand method so that the grenade arcs, landing on or near the target.

(5) Allow the motion of your throwing arm to continue naturally once you release the grenade. This follow-through improves distance and accuracy and lessens the strain on your throwing arm.

(6) Practice the necessary throws that are used in combat, such as the underhand and sidearm throws. Soldiers can practice these throws with practice grenades, but they must throw live fragmentation grenades overhand in a training environment.

b. **Throwing Positions**. In training, throwing positions are used for uniformity, control, and to familiarize soldiers with the proper manner of throwing grenades in combat if the situation gives you a choice. Consider the following throwing positions when employing grenades:

(1) *Standing*. The standing position (Figure 3-5) is the most desirable and natural position from which to throw grenades. It allows you to obtain the greatest possible throwing distance. Soldiers normally use this position when occupying a fighting position or during operations in fortified positions or urban terrain. Use the following procedures when throwing from this position:

(a) Observe the target to mentally estimate the distance. Use the proper handgrip and arm the grenade while behind cover.

(b) Assume a natural stance with your weight balanced equally on both feet. Hold the grenade shoulder high and hold the nonthrowing hand at a 45-degree angle with the fingers and thumb extended, joined, and pointing toward the intended target.

(c) Throw the grenade with a natural motion, using the procedures described in paragraph 3-3.

(d) Seek cover to avoid being hit by fragments or direct enemy fire. If no cover is available, drop to the prone position with your Kevlar facing the direction of the grenade's detonation.

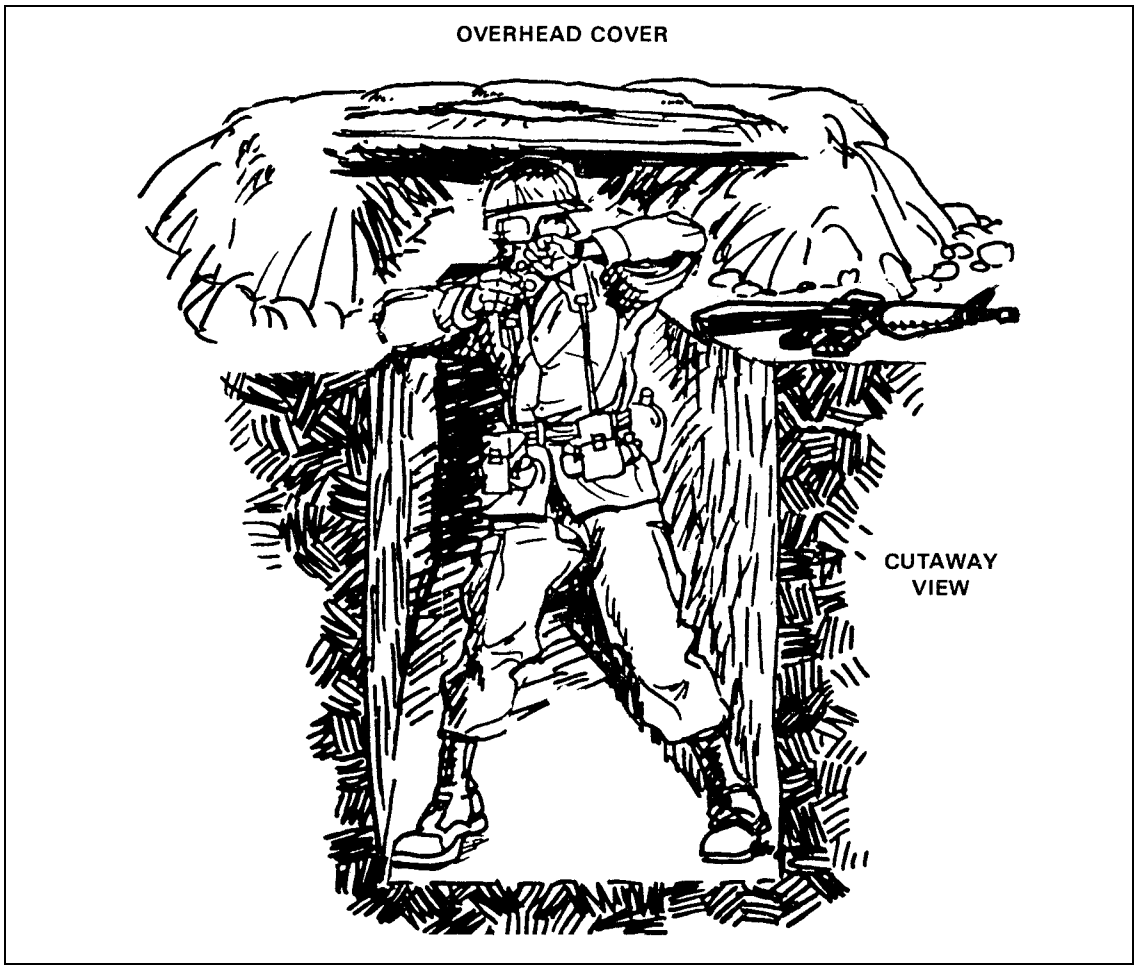


Figure 3-5. Standing throwing position.

(2) *Kneeling*. The kneeling position (Figure 3-6) reduces the distance a soldier can throw a grenade. It is used primarily when a soldier has only a low wall, a shallow ditch, or similar cover to protect him. Use the following procedures when throwing from this position:

(a) Observe the target to mentally estimate the throwing distance. Using the proper grip, arm the grenade while behind cover.

(b) Hold the grenade shoulder high and bend your nonthrowing knee at a 90-degree angle, placing that knee on the ground. Keep your throwing leg straight and locked, with the side of your boot firmly on the ground. Move your body to face sideways toward the target position. Keep your nonthrowing hand at a 45-degree angle with your fingers and thumb extended, joined, and pointing toward the enemy position.

(c) Throw the grenade with a natural throwing motion. Push off with your throwing foot to give added force to your throw. Follow through with your throwing arm as described in paragraph 3-3.

(d) Drop to the prone position or behind available cover to reduce exposure to fragmentation and direct enemy fire.

Figure 3-6. Kneeling throwing position.

(3) *Alternate prone*. The alternate prone position (Figure 3-7) reduces both distance and accuracy. It is used only when an individual is pinned down by hostile fire and is unable to rise to engage his target. Use the following procedures when throwing from this position:

(a) Lie down on your back with your body parallel to the grenade's intended line of flight. Hold the grenade at chin-chest level and remove the safety pins.

(b) Cock your throwing leg at a 45-degree angle, maintaining knee-to-knee contact and bracing the side of your boot firmly on the ground. Hold the grenade 4 to 6 inches behind your ear with your arm cocked for throwing.

(c) With your free hand, grasp any object that is capable of giving added leverage to increase your throwing distance. In throwing the grenade, push off with your rearward foot to give added force to your throw. Do not lift your head or body when attempting to throw a grenade as this exposes you to direct enemy fire.

(d) After throwing the grenade, roll over onto your stomach and press flat against the ground.

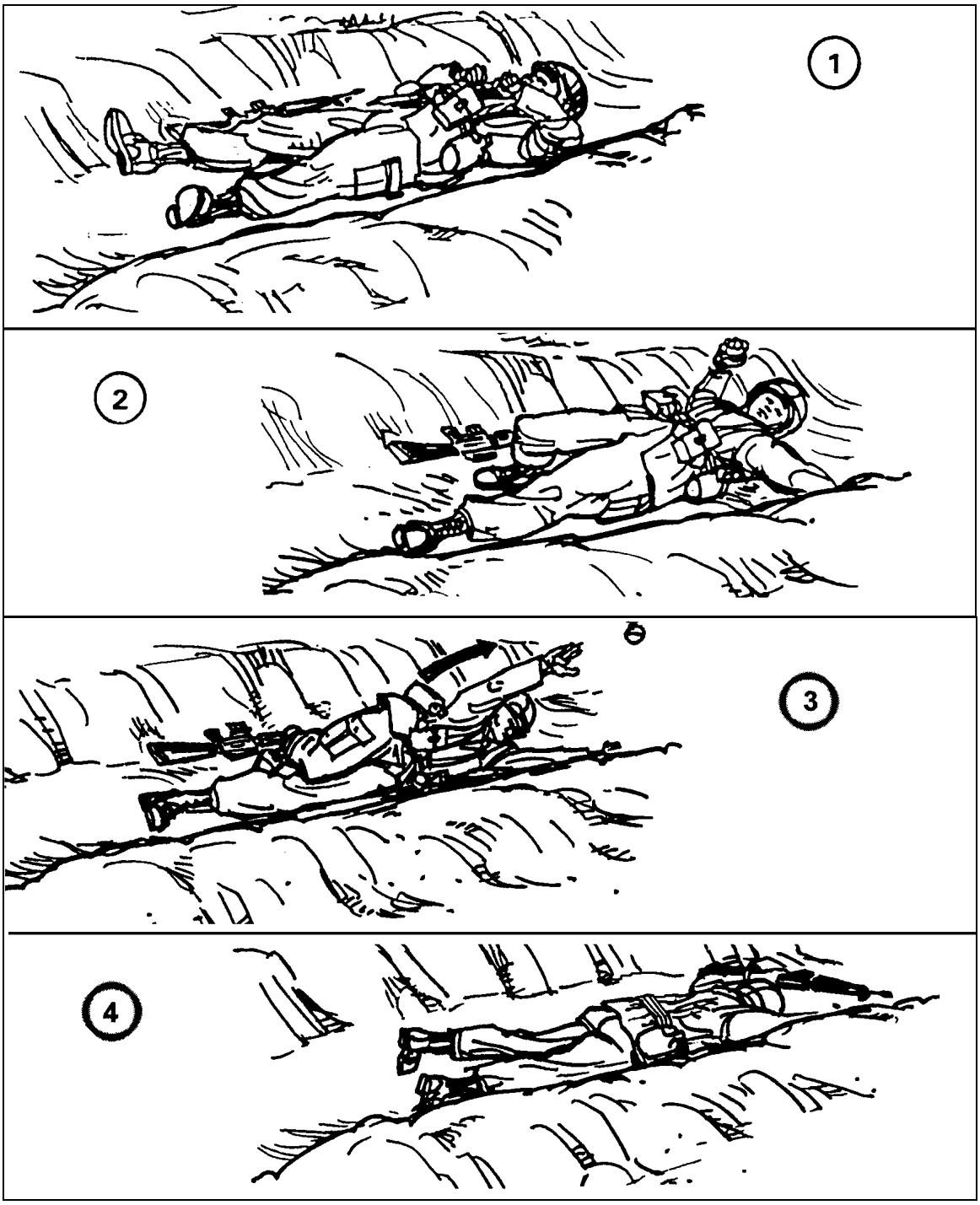


Figure 3-7. Alternate prone throwing position.

Section II. TACTICAL EMPLOYMENT

Hand grenades provide the individual soldier with a number of highly versatile and effective weapons systems. Soldiers employ hand grenades throughout the spectrum of warfare, from low to high intensity conflict, to prevent giving away positions, to save ammunition, and to inflict greater casualties.

3-4. APPLICATION

Soldiers use hand grenades in defensive missions, offensive missions, and retrograde operations. All soldiers use hand grenades during close, deep, and rear operations, during all conditions of combat, and in all types of terrain. Hand grenades have the following specific applications:

- Fragmentation hand grenades are mainly used to kill or wound enemy soldiers but can also be used to destroy or disable equipment.
- Incendiary hand grenades are mainly used to destroy equipment and start fires but can also be used to destroy or disable vehicles and weapons.
- Colored smoke is mainly used to identify or mark positions but can also be used to mark areas for ground-to-ground operations or ground-to-air operations.
- White smoke is mainly used to conceal or create a smoke screen for offensive or retrograde operations.
- Riot-control hand grenades are used to control crowds or riots.
- Stun grenades are used to temporarily stun or disorient the occupants of an enclosed area such as a building or room.

While all hand grenades have application in modern combat, the fragmentation hand grenade remains the most important because it is not only the primary killing hand grenade but also the most dangerous to employ. Fragmentation hand grenades are equally lethal to friendly and enemy soldiers; therefore, we must employ them properly to protect our own soldiers.

3-5. CLOSE COMBAT

On the modern battlefield, the close-in fight can occur anywhere, anytime. The rifle, bayonet, and hand grenade are basic weapons of warfare for the individual soldier. The rifle gives the soldier the ability to kill enemy soldiers with direct fire out to the maximum effective line-of-sight range. Fragmentation hand grenades, on the other hand, allow the soldier to effectively engage and kill enemy soldiers located within a radius of 40 meters where line-of-sight systems, including the rifle, are no longer effective. Since there is no muzzle flash, grenades also help conceal a soldier's position as he engages the enemy. While the rifle is the safest and most discriminating weapon at close ranges, the fragmentation hand grenade is the weapon of choice when the enemy is within range but the terrain masks engagement areas. The fragmentation hand grenade is the soldier's indirect-fire weapon system.

a. Many times in combat, the nature of the targets confronting the infantryman make normal methods of target engagement inadequate. Against soldiers or weapons in trenches or fighting positions, for example, having a grenade burst over the target is more effective. Furthermore, if the targets are on sloping ground, then a grenade needs to detonate as near impact as possible to prevent its rolling away from the target before detonating. Such aboveground detonation also prevents the enemy from securing the grenade and throwing it back within the 4- to 5-second fuze delay.

b. Aboveground detonation is especially critical when engaging bunker-type emplacements. To achieve aboveground detonation or near-impact detonation, remove the grenade's safety pin, release the safety lever, count ONE THOUSAND ONE, ONE THOUSAND TWO, and throw the grenade. This is called *cooking-off*. Cooking-off expends a sufficient period (about 2 seconds) of the grenade's 4- to 5-second delay. This causes the grenade to detonate above ground or shortly after impact with the target. Do not cook-off fragmentation or white phosphorous hand grenades when in training.

CAUTION
Use cook-off procedure only when in a combat environment.

3-6. PLANS AND PREPARATIONS FOR COMBAT

The theater commander normally establishes basic and combat loads of hand grenades. The combat load is not a fixed quantity; it can be altered as the situation dictates. Units vary their combat load depending upon the commander's analysis of METT-T. The most important factor in determining the combat load for hand grenades is unit mission. It influences the type and quantity of hand grenades needed. Other factors used in determining the hand grenade combat load are as follows:

a. **Weight**. Each hand grenade weighs close to one pound. Consequently, each grenade that the soldier carries adds another pound to his total load.

b. **Weapons Tradeoff**. Soldiers cannot carry everything commanders would like to take into battle. Commanders must consider the value of various weapons and munitions with a view toward determining which contribute the most to the mission accomplishment. For example, tradeoff may be required between hand grenades and mines, between hand grenades and mortar ammunition, or between different types of grenades.

c. **Balance**. Different types of hand grenades are required on all missions. Generally, fragmentation and colored smoke grenades are required for all missions. Distribute hand grenades selected for a mission among several soldiers, if not among all of them.

d. **Individual Duties**. Distribute to each soldier the hand grenades that are required for his job and assigned tasks.

3-7. EMPLOYMENT RULES

The rules to remember before employing hand grenades, or when in areas where they are in use, are as follows:

- Know where all friendly forces are located.
- Know your sector of fire.
- Use the buddy or team system.
- Ensure the projected arc of the fragmentation hand grenade is clear of obstacles.
- Evacuate positions into which you plan to throw a fragmentation hand grenade, if possible. If not, then use the grenade sump.

3-8. OFFENSIVE EMPLOYMENT

The fragmentation hand grenade is the primary type of grenade used during offensive operations. These grenades provide the violent, destructive, close-in firepower essential for the individual soldier to overcome and kill the enemy. The fragmentation hand grenade makes the individual soldier's movement easier by suppressing the enemy and disrupting the continuity of the enemy's defensive fires. Fragmentation hand grenades contribute greatly in destroying the enemy's will to continue the fight. The noise, flash, and concussion generated by fragmentation hand grenades have severe psychological effects on enemy soldiers. Offensive grenades are much less lethal than fragmentation grenades on an enemy in the open, but they are very effective against an enemy within a confined space. The concussion they produce is capable of killing or severely injuring enemy personnel, not just stunning them. Consider the following factors when employing hand grenades:

a. The critical phase of the attack is the final assault, that moment when a soldier closes with the enemy to kill him. The individual soldier uses the rifle, the hand grenade, and the bayonet during the assault. The soldier first uses the rifle, firing controlled, well-aimed shots at known or suspected enemy positions. The soldier does this as part of a buddy team, fire team, and squad. He is controlled and disciplined in his movement and application of fires by using the established unit SOPs and battle drills. These battle drills are rehearsed extensively during preparation for combat. As the soldier closes to hand grenade range, he engages the enemy with a combination of rifle fire and hand grenades. He uses fragmentation grenades to kill and suppress enemy soldiers in the open, in defilades, or in trenches. Movement toward the enemy is rapid and violent.

b. Soldiers must throw hand grenades accurately into enemy positions to reduce the chances of friendly hand grenades hitting friendly forces. Movement forward is done as part of a buddy team. One soldier within the buddy team provides overwatching, direct suppressive fire while the other soldier moves forward. Both soldiers must take advantage of the grenade explosion to immediately continue their movement forward. If the enemy is located in an enclosed area, such as a bunker or room within a building, the offensive grenade may be more appropriate than the fragmentation hand grenade. Choosing between them depends upon availability and mission analysis beforehand. Offensive grenades are less lethal to the enemy, but because of this, they are also safer to employ in confined spaces. Soldiers should follow offensive grenade employment immediately with violent rifle fire unless capturing enemy personnel is a mission requirement. Remember, an enemy who is only temporarily stunned can still kill you. The shock waves from an offensive grenade also provide better overall interior effect in an enclosed space. Another advantage of the offensive grenade is that it covers more of an enclosed space than the fragmentation grenade.

c. In an assault against a dug-in, well-prepared enemy, the soldier uses hand grenades to clear crew-served weapons first. Once the first defensive belt has been penetrated, he uses hand grenades in a priority effort to attack command bunkers and communications equipment and to kill or capture enemy leaders within those bunkers.

d. In the assault, the soldier participates as a squad member in clearing trenches, destroying bunkers, and clearing rooms. The soldier employs unit procedures, which have been rehearsed during preparation for combat. In clearing a trench within a fortified position (Figure 3-8), the buddy team forms the basis for all fragmentation grenade employment in the following manner:

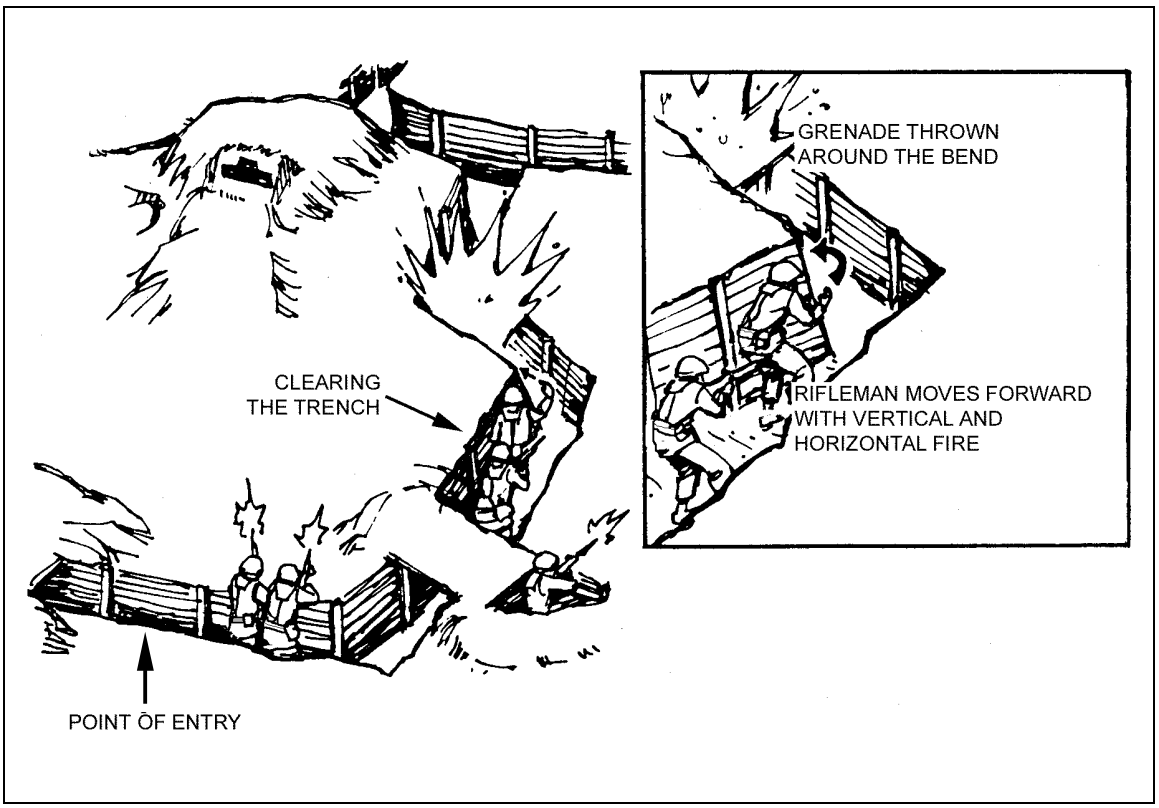


Figure 3-8. Enemy trench assault.

(1) Before entering the trench, the first clearing team throws or drops hand grenades into the trench, attempting to keep the individual grenades separated by at least five meters.

(2) After the grenades explode, the first clearing team rolls into the trench, landing on their feet and firing their weapons down both directions of the trench.

(3) The first clearing team holds the entry point.

(4) The teams following the first clearing team enter at the same position and begin clearing in one direction only (FM 7-8).

(5) As the lead buddy team moves to the right (or left), one soldier is the designated grenadier. He moves along the wall closest to the next bend in the trench. His movement is covered by his buddy, who is ready to fire at any enemy soldiers advancing toward them. The grenadier holds a grenade at the ready as he moves rapidly down the trench.

(6) At the bend in the trench, the designated grenadier throws a grenade around the bend. After the explosion, the rifleman moves rapidly around the bend and fires rapid bursts horizontally and alternately along the long axis of the trench.

(7) Movement down the trench continues by alternating the designated rifleman and grenadier roles or maintaining the same roles throughout. Fire teams and squads are bounded forward to continue clearing the trench line.

NOTE: The unit SOP specifies many of these tasks. If a three-man clearing team is used, the third member guards the back of the other team members and stands by to provide fire on point targets. (For action on the objective, see FM 7-8.)

e. Clearing an enemy bunker and killing the enemy soldiers inside requires violence and speed of execution, plus synchronization of effort at the buddy and squad level, in order to succeed. The following are procedures for clearing a bunker (Figure 3-9):

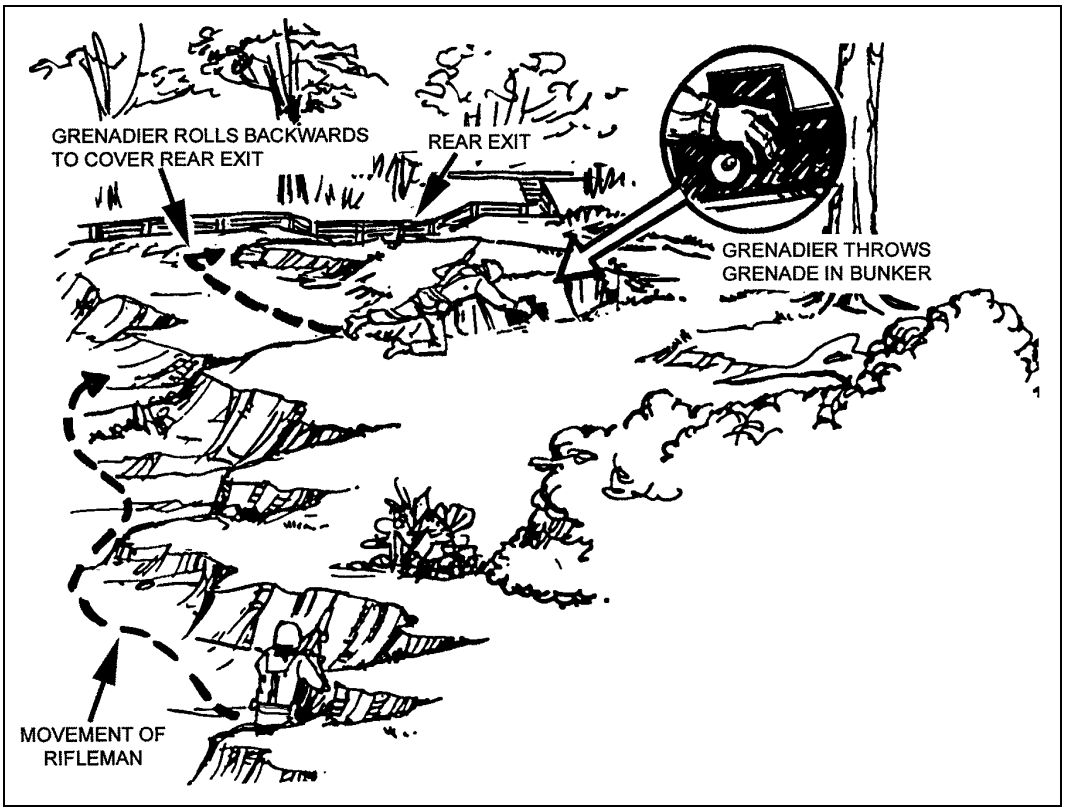


Figure 3-9. Enemy bunker assault.

(1) A two-man team assaults a single bunker using a combination of grenades and rifle fire. One member of the buddy team provides overwatching suppressive fire while the other member moves rapidly toward the bunker, using a combination of individual movement techniques. He uses the best available covered route to move toward the bunker.

(2) As he approaches to within 75 meters of the bunker, the grenadier can use white smoke to help conceal his movement for the remaining distance. The white smoke grenade should be thrown on line with the bunker and as close to the enemy's firing port as possible.

(3) Once the grenadier member of the buddy team is at the side of the bunker, he holds the grenade at a 90-degree angle from his body, releases the safety lever, mentally counts two seconds (ONE THOUSAND ONE, ONE THOUSAND TWO), and throws or pushes the grenade into the firing port of the bunker. Once he releases the grenade, he rolls away from the bunker and faces to the rear of the bunker, prepared to engage escaping enemy soldiers with his rifle.

(4) After the grenade detonates, he enters the position from the rear to kill or capture remaining enemy soldiers.

f. When clearing a room or moving through an urban area, the following considerations apply:

- What types of grenades do the ROE permit and restrict?
- What effect do I want to achieve--kill, stun, obscure, destroy equipment, mark a location, and so forth?
- Does the structural integrity of the room and building permit the types of grenades selected for use?
- Will the scheme of maneuver permit the use of fragmentation grenades and not cause fratricide?
- Will the type of grenade used cause an urban fire in an undesired location?

If employing grenades during room clearing, the following procedure should be used in conjunction with Battle Drill 6, FM 7-8, or Battle Drill 5, FM 7-7J:

(1) The Number 2 man throws a grenade into the room and yells FRAG OUT, STUN OUT, or CONCUSSION OUT, if stealth is not a factor, to alert friendly personnel that a grenade has been thrown toward the threat. After the grenade explodes, the Number 1 man enters the room, eliminates any threat, and moves to his point of domination IAW Battle Drill 6.

(2) Numbers 3 and 4 men enter the room, move to their points of domination, and eliminate any threat.

(3) The team clears and marks the room IAW unit SOP.

NOTE: Grenades tend to roll back down stairs and either nullify the desired effect(s) or cause friendly casualties.

g. The use of hand grenades during raids always depends on the mission. The raid, as a type of offensive operation, is characterized by heavy use of fragmentation and offensive grenades, but it may also require other types of grenades. Use grenades according to the following guidelines:

(1) If the mission is to secure prisoners, the employment of offensive grenades is appropriate.

(2) If the mission calls for the destruction of vehicles, weapons, or special equipment, then incendiary grenades and fragmentation grenades are appropriate.

(3) Smoke grenades are often used to create a smoke screen covering the advance of friendly forces or to mark the location of friendly forces and pickup points. Colored smoke is used mainly for signaling purposes.

h. Reaction to an enemy ambush requires an immediate, rapid, and violent response. The longer friendly forces remain in the ambush kill zone, the greater the probability of friendly force destruction. FM 7-8 and ARTEP 7-8 Drill describe friendly force reactions. Using a combination of fragmentation hand grenades to kill the enemy and white smoke grenades to obscure the enemy’s sight and rifle fire, the soldiers within a squad assault the enemy force. Train and drill soldiers to throw fragmentation grenades first, then smoke grenades.

3-9. DEFENSIVE EMPLOYMENT

Hand grenades are used in defensive operations during the final phase of the close-in battle. The primary hand grenade in all defensive operations is the fragmentation grenade. It is used in conjunction with other weapons and man-made or natural obstacles to destroy remnants

of the attacking enemy force that have succeeded in penetrating the more distant barriers and final protective fires. The fragmentation hand grenade further disrupts the continuity of the enemy attack, demoralizes the enemy soldier, and forces the enemy into areas covered by direct-fire weapons, such as rifle and machine gun fire and Claymore mines. Using fragmentation hand grenades on dismounted enemy forces at a critical moment in the assault can be the final blow in taking the initiative away from the enemy.

a. **Defense From Individual Fighting Positions** (Figure 3-10). From individual fighting positions, fragmentation hand grenades are used primarily to cover close-in dead space approaches on the friendly side of the protective wire and in front of a squad's position. Soldiers should use these grenades in conjunction with ground flares positioned along the protective wire. Enemy soldiers who are stopped at the protective wire are engaged first with Claymore mines. If time permits during the preparation of the defensive position, soldiers should identify dead space in their sectors, especially dead space that may intersect the protective wire and move toward the friendly fighting positions. These potential avenues of approach through the protective wire should be marked with a reference to identify them as primary hand grenade targets. The following rules apply when employing fragmentation hand grenades from fighting positions:

(1) Clear overhead obstructions that may interfere with the path of the thrown grenade. Do this at the same time direct-fire fields of fire are cleared.

(2) Rehearse grenade employment; know where your primary target is located.

(3) Keep 50 percent of your fragmentation grenades at the ready in your fighting position, leaving the remaining fragmentation grenades on your load-carrying equipment (LCE).

(4) Rehearse actions needed if an enemy grenade lands in your fighting position.

(5) Employ fragmentation hand grenades against enemy soldiers located in defilade positions as first priority. This lessens the danger to friendly soldiers and helps cover terrain not covered by direct-fire weapons. Use the rifle to kill enemy soldiers not in defilade positions.

(6) Reconnoiter the alternate and supplementary positions and determine the priority for the fragmentation hand grenade target.

(7) Redistribute hand grenades after each enemy engagement.

WARNING

Former Soviet Union grenades use fuzes with only a 3- to 4-second delay, which means you have very little time to react. The preferred course of action if an enemy grenade lands in your position or near you is to immediately roll out of your fighting position or throw yourself flat on the ground.

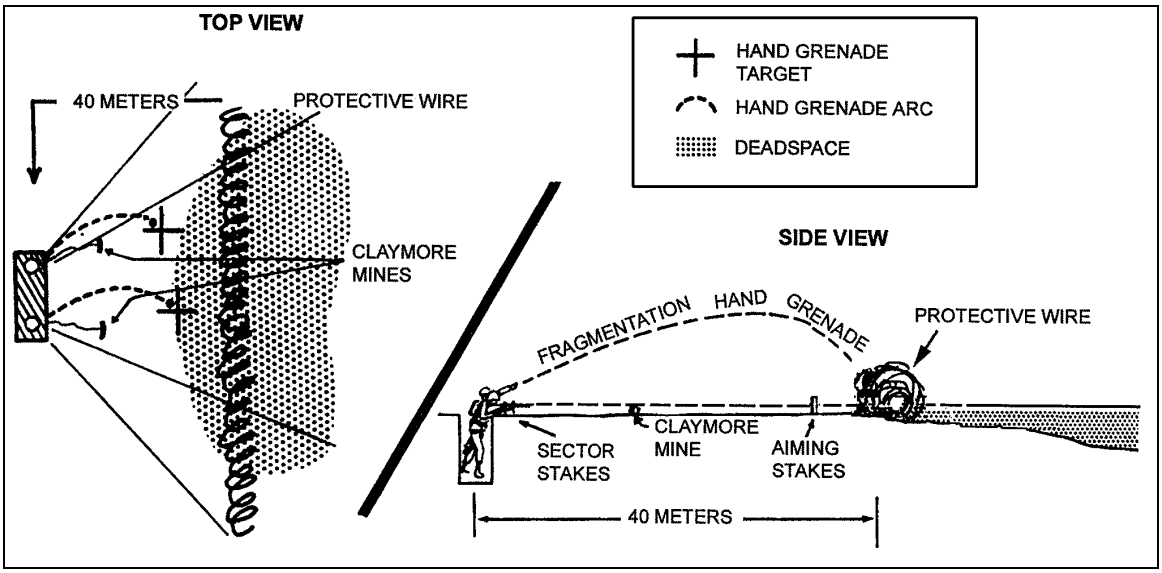


Figure 3-10. Defense from an individual fighting position.

b. **Defense Against Enemy Armored and Tracked Vehicles** (Figure 3-11). On occasion, friendly dismounted soldiers may come in close contact with enemy armored formations. Dismounted infantry should first use antitank weapons to defeat enemy armor and motorized infantry. Soldiers can also use satchel charges, as described in FM 5-250, to defeat enemy armor. If these are not available, it is still possible to destroy, immobilize, or render inoperative the vehicle or system, or to kill the crew inside the vehicle. In either case, the soldier must approach the armored vehicle to kill it or the crew with hand grenades. An understanding of some characteristics and vulnerabilities of former Soviet Union armor can help kill or disable the enemy armored vehicle or its crew. Vulnerabilities common to most threat vehicles are the fuel cells, ammunition storage areas, and power trains. Figure 3-12 highlights vulnerable areas on selected threat vehicles.

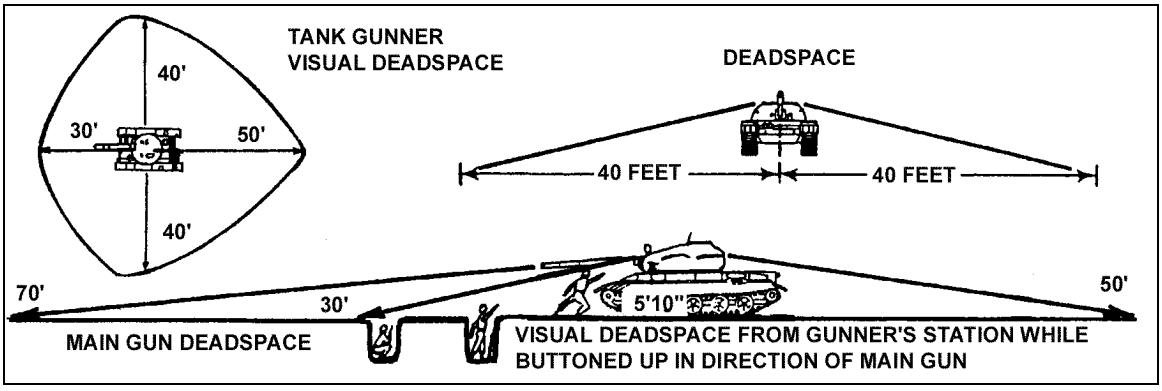


Figure 3-11. Attack of a former Soviet Union tank.

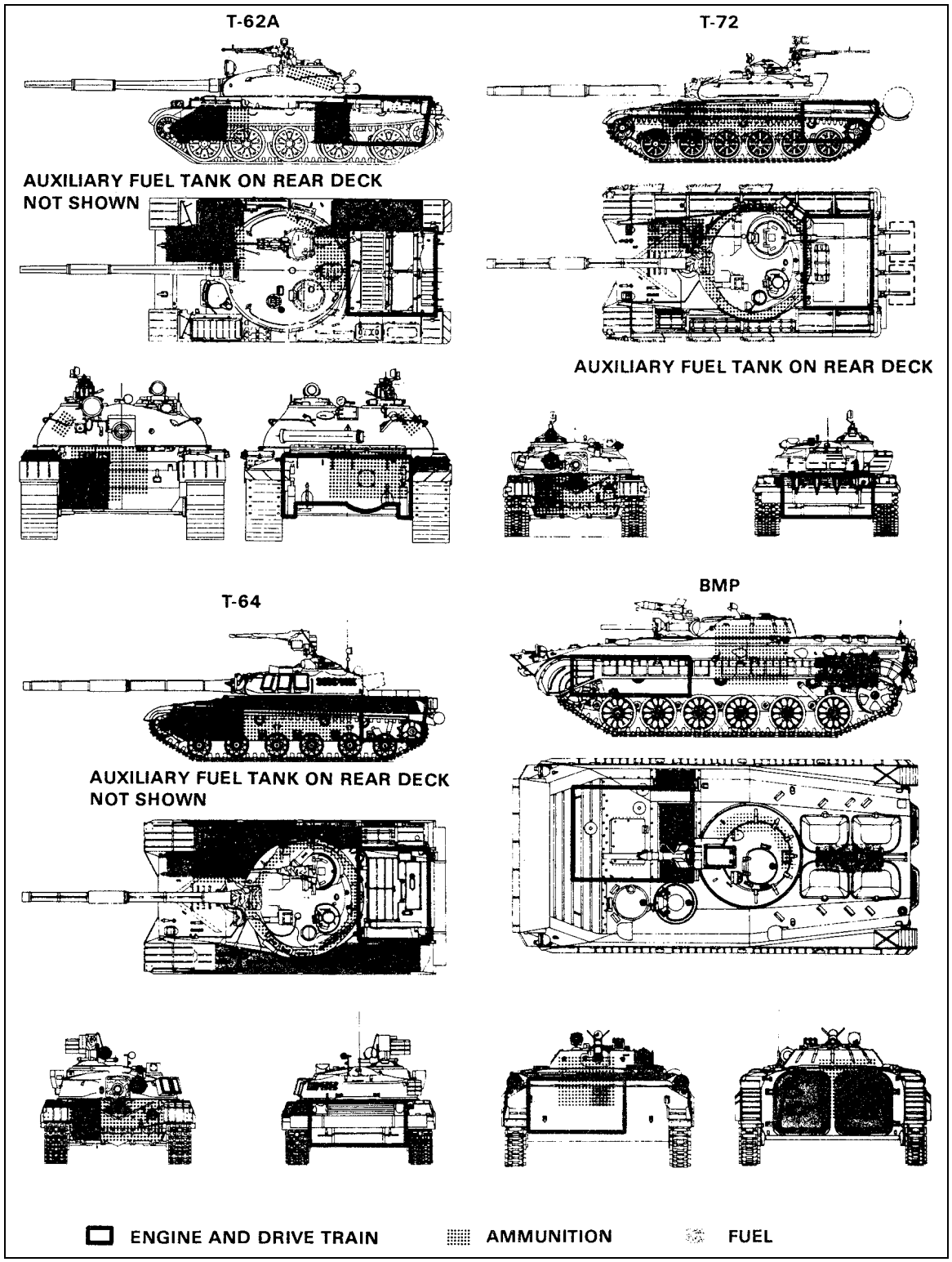


Figure 3-12. Former Soviet Union vehicle vulnerabilities.

(1) *Turret rotation*. The turrets of older former Soviet Union tanks rotate much slower than those on US and NATO tanks. It takes more than 21 seconds for T60- and T70-series tanks to rotate through a full 360 degrees. The T80- and T90-series (Figure 3-13) tanks rotate a full 360 degrees in just 6 seconds, which is as fast as the US's M1 Abrams and M2 BFV. With the older former Soviet Union tanks, a soldier can actually run around the tank before the turret traverses from the front deck to the rear. The newer tanks have been fitted with explosive reactive armor, which makes them more difficult to engage with antitank weapons. Therefore, engagement with hand grenades should be considered only as a last resort.

(2) *Visual dead space*. From the gunner's station of a former Soviet Union tank, nothing at ground level within 30 feet can be seen through the frontal 180 degrees of turret rotation. If the turret is oriented over the rear 180 degrees (the rear deck), the dead space increases to 50 feet. This means gunners on former Soviet Union tanks cannot see soldiers in fighting positions within these distances of the tank.

(3) *Fire extinguisher system*. A fire extinguisher system can be triggered manually or automatically by one of eight heat sensors. The fire extinguisher's ethylene bromide gas creates a poisonous vapor when exposed to flames. If the extinguisher discharges, the crew may have to bail out. Any weapon that can trigger a fire and the fire extinguisher system might possibly knock out a former Soviet Union tank.

(4) *BMP visual dead space*. The BMP has nine vision blocks for the eight infantrymen in the rear of the vehicle. Eight of these vision blocks, four on each side, correspond to the firing ports for the squad's weapons. These vision blocks are oriented at a 45-degree angle toward the vehicle's direction of movement. The soldier at the left rear of the vehicle mans either the left rear vision block or the last vision block and firing port on the left side. If the flank firing port is being manned, the vehicle is vulnerable to an approach from the rear. Dismounted soldiers should attempt to destroy or disable enemy armor only as a last resort. When employing hand grenades for this purpose, follow these procedures:

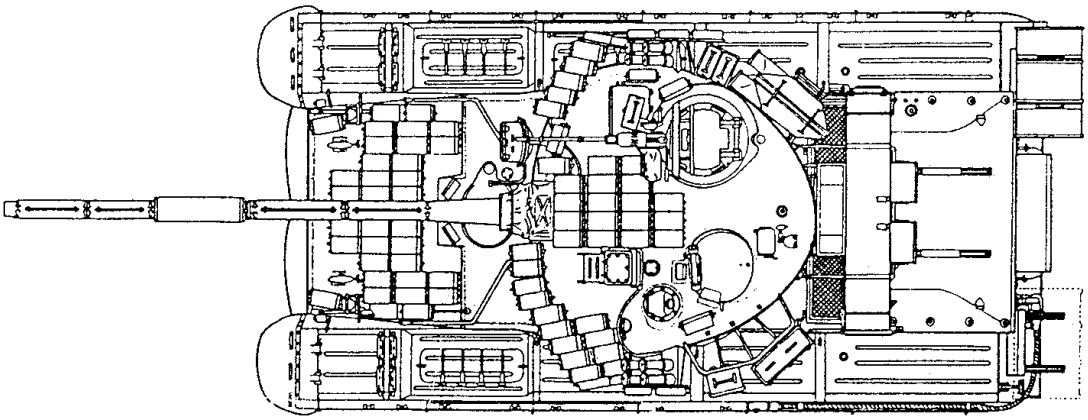
- Remain in a covered fighting position until the vehicle closes to within its visual dead space. Approach the vehicle from the rear, moving aggressively.
- Place an incendiary grenade over the engine compartment.
- Attempt to drop a fragmentation grenade into an open hatch if incendiary grenades are not available.
- Engage any crewmen who exit the vehicle.

c. **Defensive Employment on Urban Terrain**. The considerations for the defensive employment of grenades on urban terrain are generally the same as offensive considerations with respect to ROE, structural integrity of the building, fratricide avoidance, and desired effects of the type grenade to be used. Additionally, the following also apply:

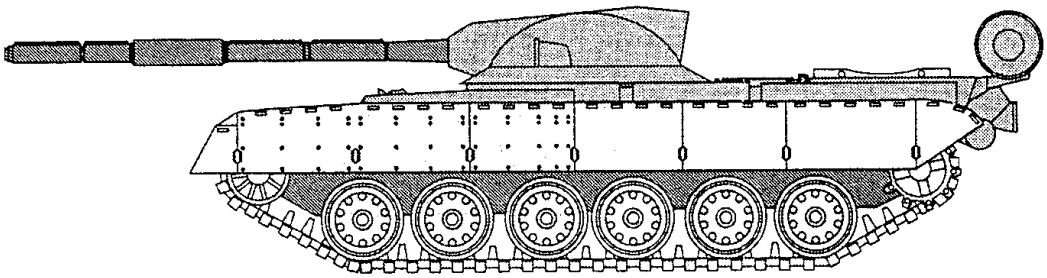
(1) Fragmentation grenades can be very effective in producing casualties when thrown at assaulting enemy troops between buildings or on streets from windows, doors, mouseholes, or other building apertures.

(2) Stun grenades can cause confusion and hesitation when thrown at assaulting enemy soldiers, allowing time for withdrawal from rooms. This is especially useful if the structural integrity of the building does not permit the use of fragmentation or concussion grenades.

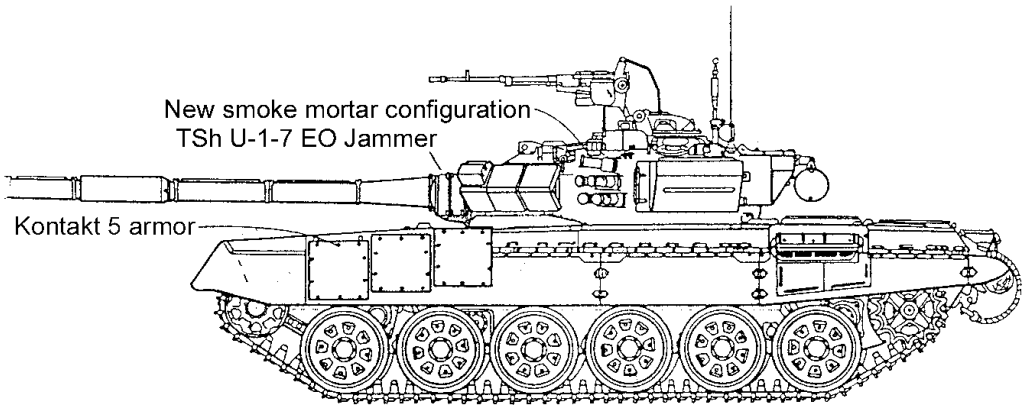
(3) Use of smoke grenades inside buildings may displace oxygen in poorly ventilated rooms and make breathing difficult while also rendering protective masks ineffective.



The T-80 BV is the T-80 B with explosive reactive armor fitted to its hull and turret; the forward parts of the skirts are also reinforced on this model (Steven Zaloga).



Outline drawing of a T-80 MBT chassis fitted with a low-profile turret armed with a 135 mm/140 mm gun fed by an automatic loader with crew seated in hull front (Jane's Intelligence Review)



Russian T-90 MBT showing key features (Steven Zaloga)

Figure 3-13. T80- and T90-series former Soviet Union tanks.

3-10. RETROGRADE OPERATIONS EMPLOYMENT

Most of the employment considerations applicable to the use of hand grenades in the defense are equally applicable to retrograde operations. Special applications or considerations for hand grenade use during retrograde operations relate to creating obstacles, marking friendly force locations, and breaking contact.

a. **Create Obstacles**. When terrain conditions permit, soldiers can use incendiary grenades to impede and disrupt enemy movement by initiating fires in specific areas.

b. **Mark Locations**. Soldiers can use colored smoke hand grenades to mark friendly force positions and identify friendly forces.

c. **Break Contact**. During retrograde operations, some elements of the friendly force most often become decisively engaged. Soldiers can use fragmentation, white smoke, and CS grenades to break contact and regain flexibility of maneuver. Use of hand grenades in volley fire following the employment of white smoke is especially effective. The smoke obscures enemy observation of friendly force movement from covered positions, and the fragmentation grenades force the enemy to cover.

3-11. REAR AREA OPERATIONS EMPLOYMENT

Army operations doctrine recognizes that the nature of a future war poses a significant threat to rear areas. These threats range from large operational maneuver groups to highly trained, special operating forces and even terrorists. All US soldiers in combat, CS, and CSS units must be prepared to fight using small arms, antitank weapons, Claymore mines, and fragmentation grenades. At every element level throughout the corps battle area, individual US soldiers must react to every action by aggressive, violent employment of grenades and individual weapons. There is no safe zone on the battlefield; therefore, leaders must plan for the following:

a. **Special Considerations**. Two features of rear area operations provide for unique considerations concerning hand grenade employment. In certain areas of the world, the US Army and its allies must anticipate a large number of civilian refugees moving into and through the rear area. This situation can be confusing with the large numbers of CS and CSS units operating throughout the rear area. These factors dictate the following guidelines for hand grenade employment in the rear areas:

(1) *Offensive grenades*. Individual soldiers throw offensive grenades at enemy soldiers in situations where noncombatants and support troops may be intermingled with threat forces.

(2) *Riot-control grenades*. It is reasonable to expect enemy special forces, special agent provocateurs, and fifth columnists to attempt to incite riots in our rear areas, especially if the conflict begins to stalemate and does not result in the rapid victory for either side. Forces in the rear area must quell these riots as rapidly as possible while reducing damage to the lives and property of noncombatants. Riot-control grenades, which are usually associated with peacetime law and order functions, also have relevancy in maintaining control of the rear area.

b. **Base Cluster Defense**. Base cluster commanders must organize the defense of their positions in much the same manner as tactical commanders in the MBA. Accordingly, the employment of hand grenades from defense positions surrounding the base cluster should follow the same considerations as hand grenade employment by combat units in the MBA.

3-12. USE UNDER ADVERSE CONDITIONS

While hand grenade procedures do not change when employed under adverse conditions, special cautions must be considered.

a. **MOPP4**. Exercise additional caution when employing hand grenades in MOPP gear. The thrower should execute arming and throwing procedures carefully and deliberately and should concentrate on using the proper grip. Observing each arming action (removal of safety clip and safety pin) is also recommended in MOPP. Note that wearing gloves inhibits the thrower's feel and could decrease his throwing ability and range.

b. **Night**. Throwers must have clear fields of fire with no overhead obstructions. Depth perception is generally impaired under limited visibility conditions.

CHAPTER 4

TRAINING PROGRAM

The intended outcome of all hand grenade training programs is to train soldiers proficient in using hand grenades for any tactical situation. The training program should incorporate safe handling and throwing practices, which reduce injuries in peacetime as well as in combat. Initially, training programs require extensive direct supervision, but the amount of supervision required decreases as the soldiers' proficiency increases.

4-1. OBJECTIVES

The hand grenade training program progresses using the crawl-walk-run methodology. The program progresses from fundamental to advanced training, culminating with the integration of hand grenades into situational and field training exercises. Once soldiers reach a high-proficiency level, a sustainment program is implemented to maintain this level. The following progressive training outline is for use or modification:

- Instruction on safety inspection and maintenance of hand grenades.
- Instruction on visual identification of hand grenades.
- Instruction on capabilities of hand grenades.
- Technical instruction on grenade function.
- Instruction and practical exercises on fundamentals of gripping procedures, throwing techniques, and throwing positions.
- Practical exercises emphasizing distance and accuracy using targets of different types at various ranges.
- Advanced training courses that incorporate buddy teams, movement techniques, weapon integration, and multiple target engagements at various ranges.

4-2. TRAINING COURSES

The training courses listed in this chapter, except for the standard Army hand grenade qualification course, are offered as models to assist units in meeting their training objectives. These courses can be modified to support the unit METL, the terrain, and the commander's intent. Minimum course standards for basic training units have training stations that include the following:

a. **Distance and Accuracy**. The distance and accuracy course is designed to develop the soldier's proficiency in gripping and throwing hand grenades. When conducting the training, provide soldiers with a course orientation, explanation, and demonstration, including clarification of the tasks, conditions, and standards for the course and followed by a demonstration that meets the stated standards. To develop good safety habits, supervisors and instructors must ensure the soldiers use proper throwing techniques. During the initial practical exercise, soldiers are allowed to observe the strike of the grenade so they can gain an appreciation for the weight of the grenade and the amount of force required to throw it accurately. After initial training, however, soldiers should follow the proper procedures for seeking cover after throwing a grenade. The following is a generic task with conditions and standards to assist units.

TASK: Engage a variety of targets at varying ranges up to 40 meters.

CONDITIONS: Given 12 practice grenades, individual equipment, and a four-station course with a variety of targets at distances of 20, 30, and 40 meters.

STANDARDS: The soldier must successfully engage targets at each station with two out of three grenades. The soldier must throw from the alternate prone, prone to kneeling, and prone to standing positions. A target is successfully engaged when the grenade detonates within 5 meters of the target.

(1) Recommend a four-station course layout (Figure 4-1). The four stations may be combined if the terrain does not allow four stations.

(2) Targets should include soldiers in the open at 20 meters, a fortified mortar pit at 20 meters, a fighting position at 30 meters, and a trench target at 40 meters.

b. **Bunker Complex**. The bunker complex (Figure 3-9, page 3-13) exercise is designed to develop the soldier's proficiency on how to properly attack a bunker complex from a covered and concealed location while using the proper movement techniques and the hand grenade cook-off technique. When conducting the training, give soldiers clarification on the task, conditions, and standards, followed by a demonstration and standards for the station. The following is a generic task with conditions and standards to assist units.

TASK: Engage an enemy bunker complex.

CONDITIONS: Given an individual weapon, LCE, cover and concealment, supportive fire, and two M69 practice hand grenades.

STANDARDS: The soldier must successfully engage and disable a bunker. The soldier must approach the bunker from the blind side, properly cook-off the grenade, put the grenade into the porthole of the bunker, roll away from the bunker, and turn 180 degrees to cover the rear exit of the bunker. The grenade must detonate in the bunker.

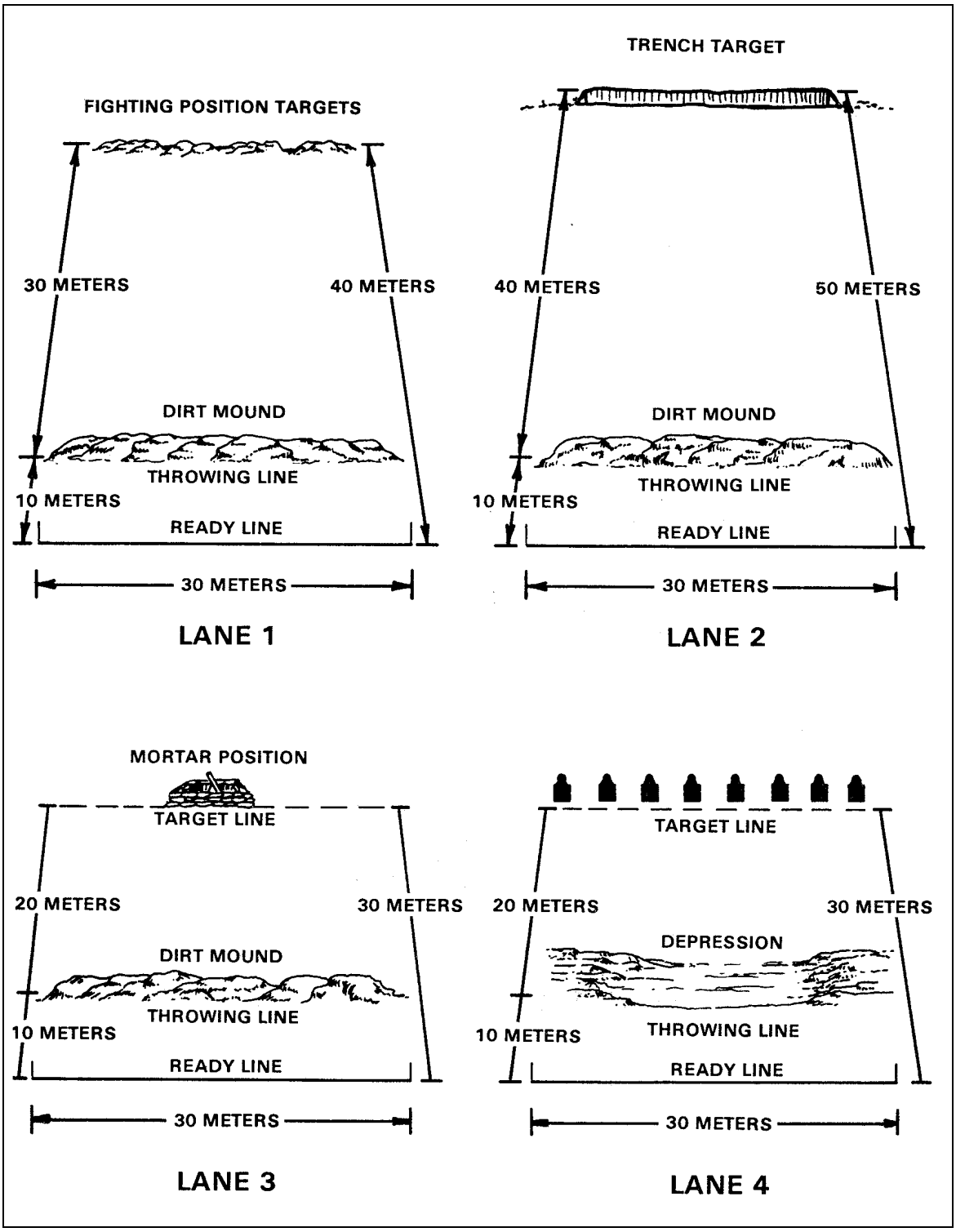


Figure 4-1. Distance and accuracy layout.

c. **Identification of Basic US Army Hand Grenades**. The purpose of this training is to develop the soldier's proficiency in identifying basic hand grenades within the US Army inventory. The soldier should receive instruction on the capabilities and identification features of the M83, M18, M14, ABC-M7A2/A3, and the M67 fragmentation hand grenades. For seasoned soldiers, other hand grenades can be added for test purposes to increase the soldiers' ability to identify other grenades. Basic training recruits must identify five out of five grenades in order to get a GO.

d. **Hand Grenade Qualification Course**. The purpose of the qualification course is to measure and evaluate the soldier's ability to engage a variety of targets with hand grenades using the proper gripping procedures and throwing techniques. The qualification course allows the soldier to gain confidence in arming and throwing hand grenades. All soldiers must go through mock-bay training before going to live bay. The qualification course should not be attempted until all initial training has been completed. The qualification course allows soldiers to use fuzed practice hand grenades to engage targets in natural terrain under simulated combat conditions. An incentive for a soldier to perform well is the award of a hand grenade qualification bar worn on his marksmanship medal. The hand grenade qualification course is standardized throughout the US Army. The course consists of seven stations with one grader at each station. The course is conducted in two-man teams, but soldiers are evaluated individually. The stations' requirements are as follows:

- Station 1. Engage a group of F-type silhouette targets in the open from a two-man fighting position. The targets are located 35 meters to the front of the fighting position, simulating enemy movement through and beyond the squad's protective wire.
- Station 2. Engage a bunker using available cover and concealment. The bunker can have one or two firing portholes oriented toward the direction of the buddy team's movement and a rear exit.
- Station 3. Engage a fortified 82-mm mortar position from 20 meters.
- Station 4. Engage a group of enemy targets behind cover at a 20-meter distance.
- Station 5. Clear an entry point to a trench line at a 25-meter distance.
- Station 6. Engage troops in a halted, open-type wheeled vehicle at a 25-meter distance.
- Station 7. Identify hand grenades. Soldiers must be able to identify grenades by shape, color, markings, and capabilities. (For a suggested identification station, refer to Figure 4-2.)

Although no two hand grenade qualification courses are alike, the standards must be consistent. The scorecard at Figures 4-3 (front) and 4-4 (back) establishes the action, condition, standard, and scoring procedure for the qualification course. DA Form 3517-R is located in Appendix G of this manual and can be locally reproduced on 8 1/2- by 11-inch paper. Qualification must be awarded only to those soldiers who meet these standards. The evaluator at each station determines scoring IAW the standard scorecard. (For an example of a physical layout, see Figure 4-5.)

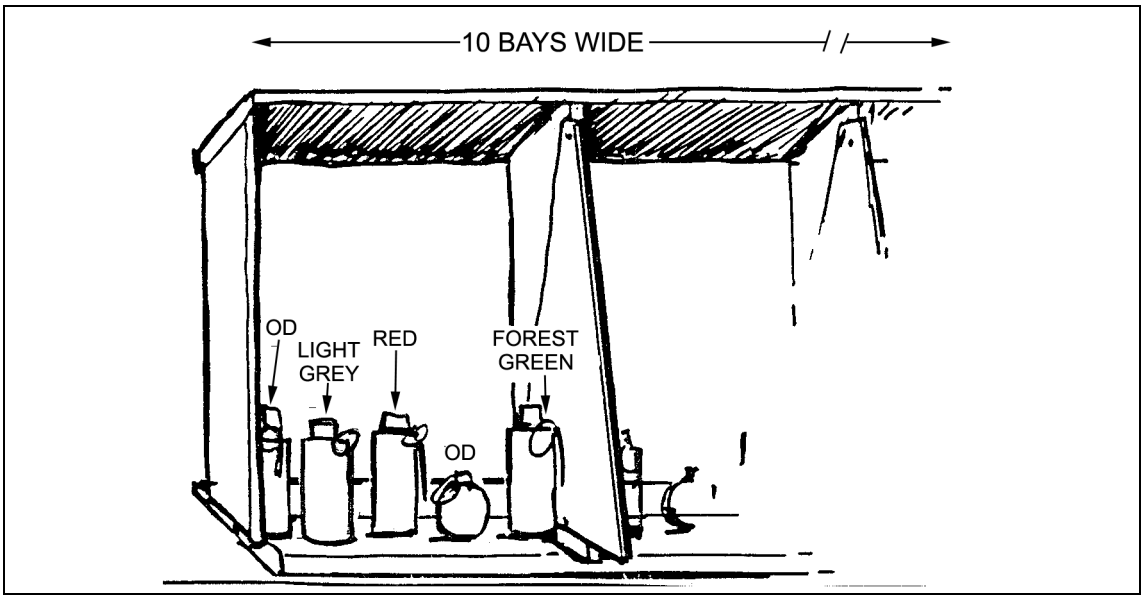


Figure 4-2. Suggested identification station.

HAND GRENADE QUALIFICATION SCORECARD
For use of this form, see FM 23-30. The proponent agency is TRADOC.

NOTE: In addition to the requirements on this scorecard, the soldier must throw two live fragmentation grenades to qualify.

A. DATE LIVE GRENADES WERE THROWN		B. INITIALS
6 March 2000		**CAM**
C. NAME (*Last, First, Middle Initial*)		D. DATE
Martinez, Carlos A.		**6 March 2000**
E. GRADE	F. SSN	G. UNIT
E7	**123-45-6789**	**A Co, 2/29**

H. STATION	I. TYPE TARGET	J. GO	K. NO-GO	L. SCORER'S INITIALS
1	**Engage Enemy from Fighting Position at a Range of 35 Meters** *(Standing)*	✓		**S.T.**
2	**Engage Bunker**	✓		**K.F.**
3	**Engage 82-mm Mortar Position at 20 Meters** *(Kneeling)*	✓		**L.J.**
4	**Engage Enemy Behind Cover at 20 Meters** *(Alternate Prone)*	✓		**J.P.**
5	**Engage Trench at 25 Meters** (*Standing)*	✓		**J.C.**
6	**Engage Wheeled Vehicle at 25 Meters** *(Kneeling)*		✓	**M.S.**
7	**Identify Hand Grenades**	✓		**D.F.**

M. QUALIFICATION STANDARD

		CHECK
PASSED 7	EXPERT	
PASSED 6	FIRST CLASS	✓
PASSED 5	SECOND CLASS	
PASSED 4 OR LESS	UNQUALIFIED	

N. SIGNATURE OF SCORER/OIC

E. R. Stone

DA FORM 3517-R ___ 99 DA FORM 3517-R, NOV 88, IS OBSOLETE.

Figure 4-3. Example of a scorecard (front).

STATION 1. Engage Enemy from Fighting Position at a Range of 35 Meters *(Standing)*		
PERFORMANCE MEASURES	GO	NO-GO
A. Detonated at least one grenade within 5 meters of the center of target.	✓	
B. Kept exposure time under 3 seconds.	✓	
C. Returned to covered position after each throw.	✓	
D. Used proper grip.	✓	
E. Used proper throwing techniques.	✓	
F. Completed performance measures 1A through 1E within 15 seconds.	✓	
STATION 2. Engage Bunker		
A. Approached from blind side.	✓	
B. Checked for bunker opening.	✓	
C. Detonated grenade in bunker.	✓	
D. Rolled away from bunker.	✓	
E. Used proper grip.	✓	
F. Use cook-off technique.	✓	
G. Completed performance measures 2A through 2E within 15 seconds.	✓	
STATION 3. Engage 82-mm Mortar Position at 20 Meters *(Kneeling)*		
A. Detonated at least one grenade inside mortar position.	✓	
B. Kept exposure time under 3 seconds.	✓	
C. Returned to covered position after each throw.	✓	
D. Used proper grip.	✓	
E. Used proper throwing techniques.	✓	
F. Completed performance measures 3A through 3E within 15 seconds.	✓	
STATION 4. Engage Enemy Behind Cover at 20 Meters *(Alternate Prone)*		
A. Detonated at least one grenade within 5 meters of the center of target.	✓	
B. Kept exposure time under 3 seconds.	✓	
C. Returned to covered position after each throw.	✓	
D. Used proper grip.	✓	
E. Used proper throwing techniques.	✓	
F. Completed performance measures 4A through 4E within 15 seconds.	✓	

STATION 5. Engage Trench at 25 Meters (*Standing*)		
PERFORMANCE MEASURES	GO	NO-GO
A. Detonated at least one grenade inside trench.	✓	
B. Kept exposure time under 3 seconds.	✓	
C. Returned to covered position after each throw.	✓	
D. Used proper grip.	✓	
E. Used proper throwing techniques.	✓	
STATION 6. Engage Wheeled Vehicle at 25 Meters *(Kneeling)*		
A. Detonated within 1 meter of vehicle or within 5 meters of dismounting troops.	✓	
B. Kept exposure time under 3 seconds.	✓	
C. Returned to covered position after each throw.	✓	
D. Used proper grip.		✓
E. Used proper throwing techniques.	✓	
F. Completed performance measures 6A through 6E within 15 seconds.	✓	
STATION 7. Identify Hand Grenades		
A. Selected fragmentation grenade to engage enemy soldiers.	✓	
B. Identified M83 grenade as "White Smoke" or "HC smoke."	✓	
C. Identified M18 grenade as "Colored Smoke" or "Purple (and so forth) Smoke." (*If specific color is stated, it must be the same color as on the training aid grenade used.*)	✓	
D. Identified M7A2/A3 grenade as CS or riot control.	✓	
E. Identified M14 grenades as incendiary.	✓	

NOTES:

1. **FOR PERFORMANCE MEASURES 7A THROUGH 7E, IF THE EXAMINEE CANNOT CORRECTLY STATE THE NAME OF THE GRENADE BUT CAN CORRECTLY IDENTIFY ITS USE, THEN THE EXAMINEE IS SCORED A "GO."**
2. **EACH PERFORMANCE MEASURE AT EACH SECTION IS GRADED ON A PASS/FAIL STANDARD. A SOLDIER MUST PASS ALL OF THE STANDARDS TO RECEIVE A "GO" ON THAT STATION.**

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Figure 4-4. Example of a scorecard (back).

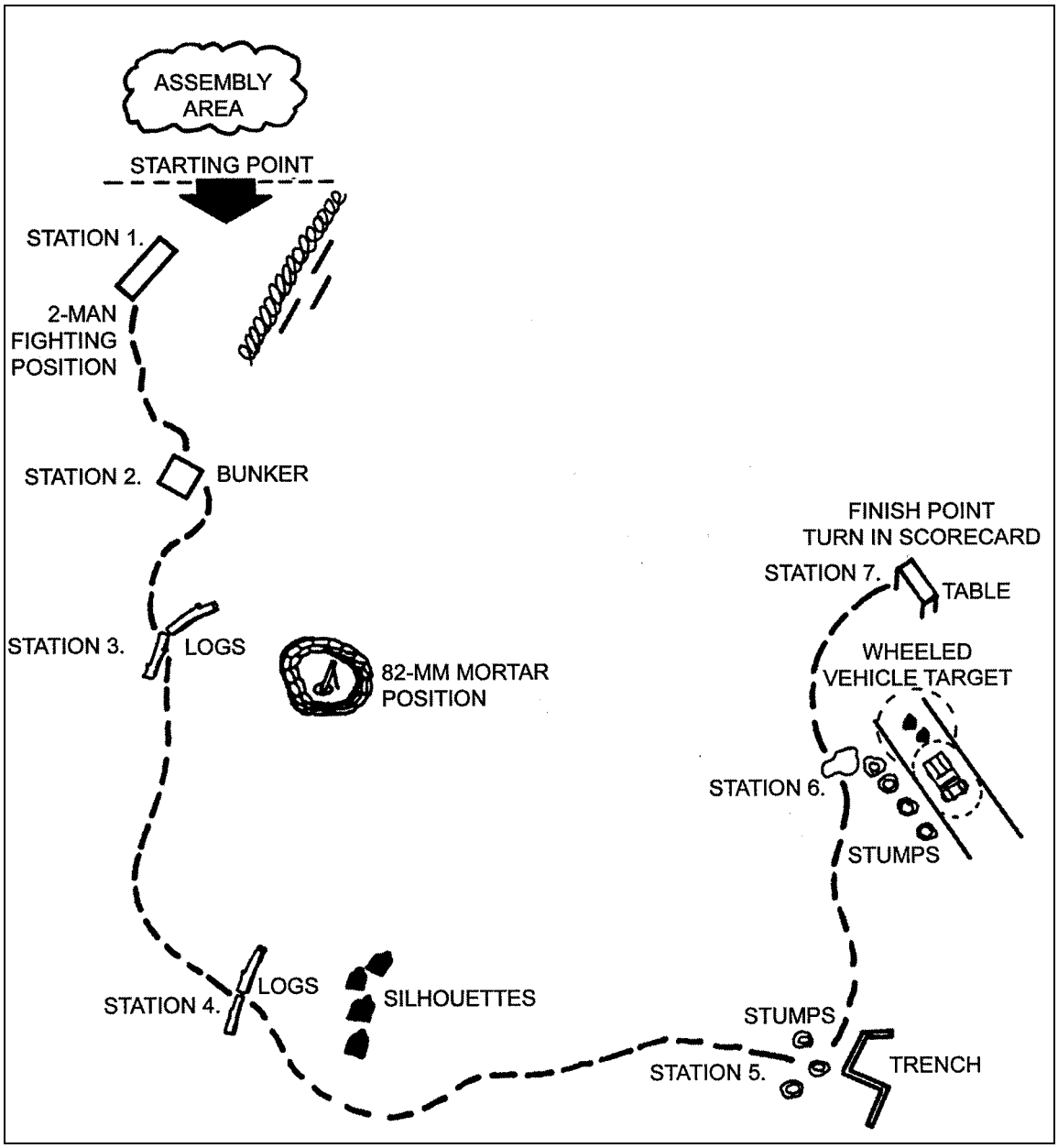

Figure 4-5. Qualification course layout.

e. **Mock-Bay Training**. When soldiers practice throwing grenades before going to live bay to throw, it is called mock-bay training. This training introduces the soldier to throwing commands and provides additional throwing practice. Soldiers are oriented to the mock-bay training pit and given an explanation of the commands that are used during actual throwing. Soldiers also practice the actual procedures used during live-bay training. The instructor enforces correct throwing and safety procedures. Improper techniques or bad habits, which a soldier could carry over to live-bay training, cannot be tolerated. The following is a generic task with conditions and standards to assist units:

TASK: Successfully throw practice hand grenades from the mock-bay pit and follow all commands from the instructor or NCOIC.

CONDITIONS: Given individual equipment, to include flak vest, practice hand grenades, a mock-bay pit that replicates a live-bay pit, ear plugs, and an orientation and safety briefing.

STANDARDS: Soldiers must safely carry, arm, and throw two practice hand grenades from the mock-bay pit while following the commands from the instructor or NCOIC. Soldiers must not move from the cover of the pit until the command CLEAR, ALL CLEAR is given.

NOTE: Be sure the physical layout of the mock-bay pit replicates the live-bay pit. This technique not only gives the soldier the sensation of throwing a live fragmentation hand grenade, but also instills confidence in his ability to throw the hand grenade and shows him its lethality. The procedures and techniques for conducting live hand grenade range operations depend upon available facilities and their regulations. Each facility has its own safety features and training qualities, so it is difficult to standardize the operating procedures.

f. **Live-Bay Training**. The purpose of the live-bay pit is to give soldiers the opportunity to experience throwing a live fragmentation hand grenade. The following guidelines are provided to assist in the conduct of live hand grenade training:

(1) Soldiers must have mock-bay training before throwing live grenades at live bay.

(2) Soldiers must receive a safety briefing before throwing live grenades.

(3) Throughout hand grenade training, especially at a live-bay pit, instructors must instill confidence in the soldiers, not apprehension. Hand grenades are inherently safe when used properly.

(4) Soldiers throwing live hand grenades must have a target. This makes sense tactically and provides a safer training environment. Consult the local range regulations for any restrictions.

(5) If facilities permit, an observation window allows the soldiers to observe the live-bay throwing procedures before and after throwing the hand grenades. (For a suggested live-bay layout, see Figures 4-6 and 4-7.)

(6) Soldiers must carry the hand grenades to the throwing pits using the proper right or left handgrips.

(7) Soldiers must wear flak vests, Kevlars, ear plugs, and eye armor, if available.

NOTE: Instructors check the soldiers using the Live Hand Grenade Range Operations Checklist in Appendix A.

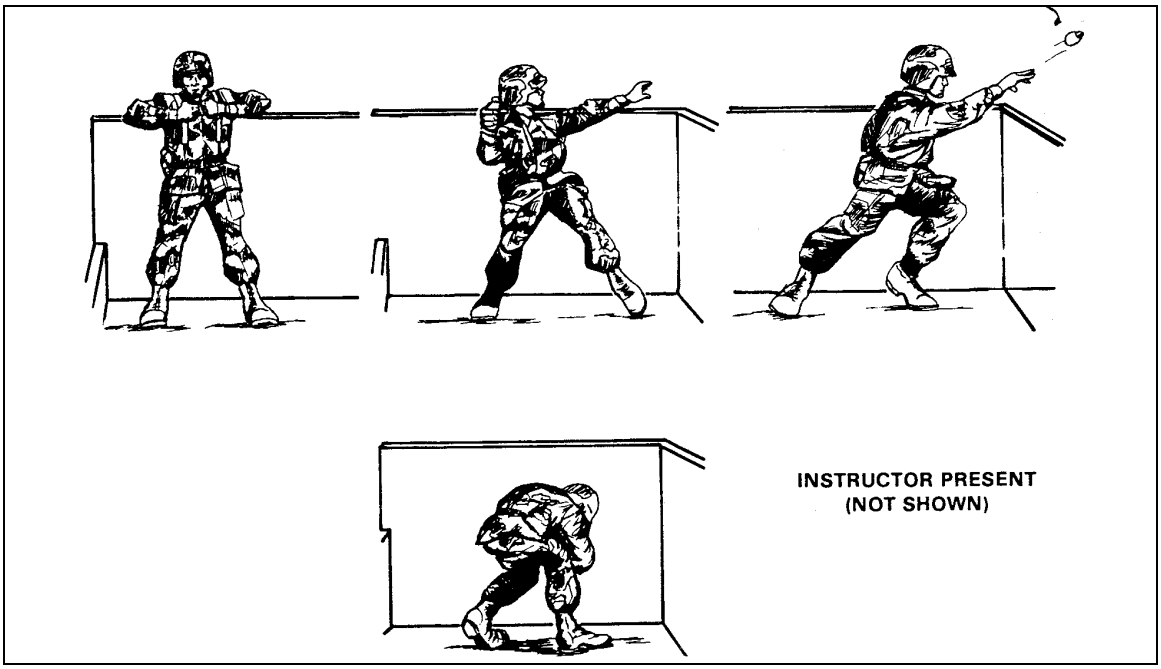

Figure 4-6. Live-bay throwing pit.

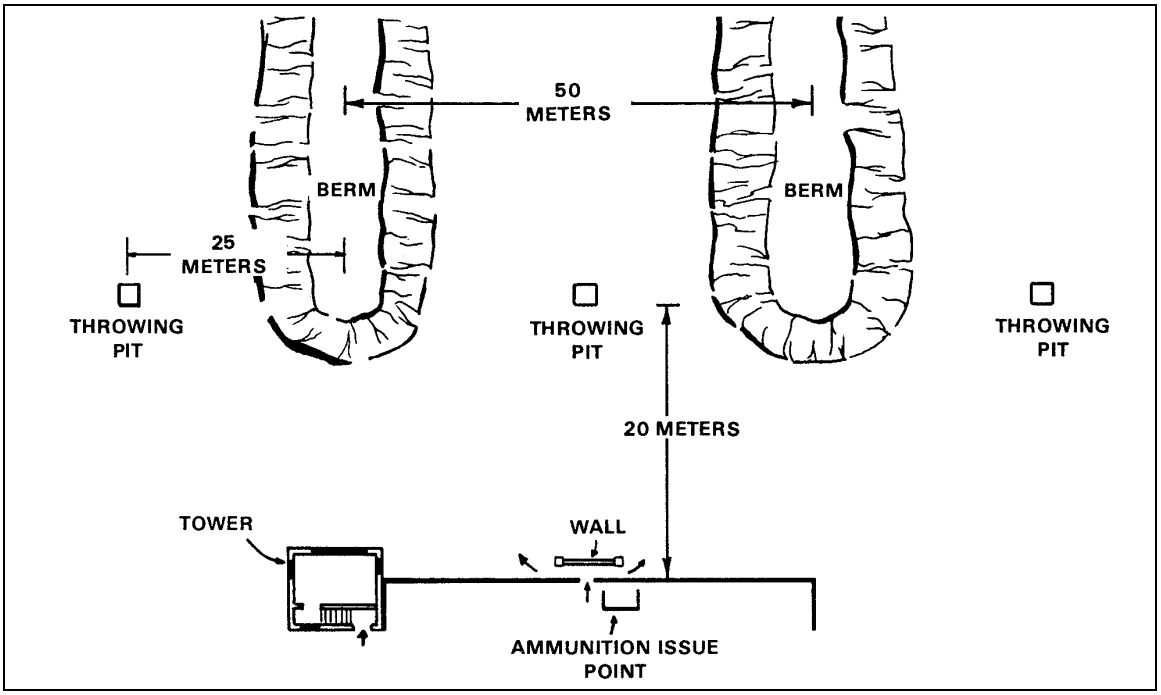

Figure 4-7. Suggested live-bay layout.

The following is a generic task with conditions and standards to assist units.

TASK: Engage targets with live fragmentation grenades.

CONDITIONS: Given individual equipment, to include Kevlar, LCE, flak vest, earplugs, a facility for live hand grenade throwing, and live fragmentation hand grenades.

STANDARDS: The soldier must safely arm and throw two live fragmentation hand grenades. The soldier must carry grenades using the proper right or left handgrips and comply with all throwing commands and instructions from the pit NCO.

g. **Hand Grenade Confidence Course**. Once the soldier has developed his throwing proficiency and has been introduced to throwing casualty-producing hand grenades, he needs an opportunity to apply his newly acquired proficiency in a simulated tactical situation requiring the use of grenades. The hand grenade confidence course is designed to accomplish this objective (Figure 4-8). The hand grenade confidence course has a practice and live course, each consisting of an assembly area, a final coordination line, an initial holding area, a covering position, a throwing position, and a final holding area. The following guidance is given to initiate the confidence course:

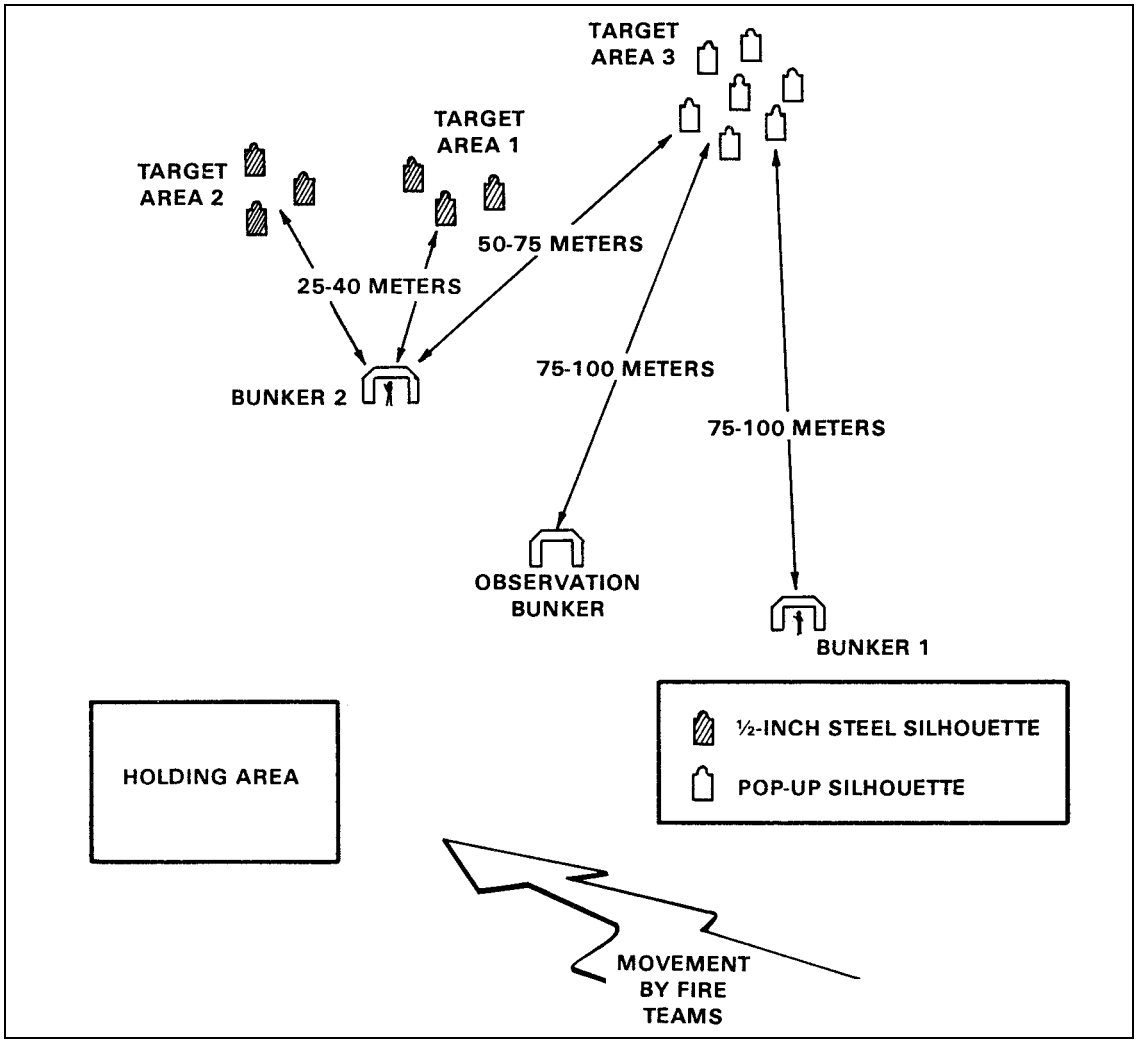

Figure 4-8. Confidence course layout.

(1) *Conduct of course*.

(a) The course begins with an orientation period covering the characteristics and functioning of practice and fragmentation hand grenades, safety considerations governing the conduct of training, and a discussion and demonstration of the conduct of the course for the entire unit being trained.

(b) Following the initial orientation, each platoon moves to a separate assembly area for the practice course. The OIC of the range presents a tactical situation, and unfuzed practice hand grenades are issued to the platoon for the practice portion of the course. The OIC inspects all personnel before they negotiate the course to make certain that all grenades are properly secured. The OIC determines whether to issue grenades to the soldiers in the holding area or at the throwing bunker, depending upon their experience and proficiency.

(c) The first squad moves in line formation, ALPHA team on the right, from a tree line that represents the final coordination line of the practice course.

(d) Upon arrival at a mound representing the initial holding area, the squad is taken under fire by a machine gun simulator. The squad leader sends two men from the right side of the line to bunker number one near the objective. One man lays down a base-of-fire at target area number three. The safety officer directs the number-one man on the right to move to bunker number two within hand grenade range of the objective. From bunker number two, the soldier continues to fire his weapon until all far targets are suppressed. He then observes target area number one and engages it with a practice hand grenade. When the grenade is thrown, the safety officer commands ALL DOWN. This command pertains to everyone in the training area. At this time, all personnel get behind protective cover. After the grenade functions, the safety officer counts to seven, which indicates the amount of time personnel must remain behind the protective cover. The soldier engages target area number two with a second practice hand grenade. When the grenade is thrown, the safety officer commands ALL DOWN.

(e) The soldier who threw the grenades moves by the most direct route back to the final holding area where the critique NCO critiques him. Covering fire is continued from bunker number one. The squad leader then sends a new man to bunker number one where he provides covering fire as the number-two man moves to bunker number two to throw his grenades. After the second grenade functions, the soldier being critiqued by the critique NCO moves directly to the initial holding area.

(f) The above sequence is repeated until all squad personnel have thrown grenades and provided covering fire. The first soldier to throw grenades provides covering fire for the last man to throw.

(g) After the first group has finished the practice course and critique, the group returns to the assembly area and then moves to the live course area for the final run with fragmentation grenades. After the first group has completed the practice course, the practice and live courses are run concurrently on separate training areas.

NOTE: On the practice course, blank rifle ammunition and practice grenades are used. Live ammunition and two live grenades are used in the conduct of the live course. The safety officer must make sure the soldiers remove the blank adapters before issuing ammunition.

(h) The safety officer on the practice course carefully observes the actions of the soldiers throwing practice grenades. If the safety officer detects any unsafe acts or extreme nervousness on a thrower's part, the thrower is identified to the critique NCO. The critique NCO points out the thrower's mistakes and sends him back through the practice course. In some instances, it may be necessary to place an individual who has extreme difficulty in properly handling grenades under the control of an assistant instructor for detailed instruction. Under no circumstances can a man be allowed to throw live fragmentation grenades until he has clearly demonstrated his ability to throw practice grenades during the practice portion of the course.

(2) *Safety personnel*. The following safety personnel are required for the hand grenade confidence course:

(a) Officer in charge. The OIC or NCOIC (E7 or above) is responsible for the overall conduct of the training, the bleacher orientation, and the tactical briefing. After the OIC or NCOIC issues the operation order in the assembly area, the safety officer is positioned in the safety bunker where he has the immediate responsibility of supervising hand grenade throwing.

(b) Squad leaders. The squad leaders alternate moving squads to and from the initial holding areas. They are responsible for ensuring that all personnel are behind protective cover in the initial holding area when grenades are being thrown. Squad leaders must check each soldier's grenades before he moves from the initial holding area to bunker number one.

(c) Safety officer. The safety officer is the senior assistant instructor. He must be an E6 or above. Positioned in bunker number one, he controls the movement of all personnel both before and after each grenade is thrown. He also controls the soldier furnishing covering fire.

(d) Critique NCO. The critique NCO is positioned in the final holding area. He critiques each thrower immediately after the soldier arrives from bunker number two. To ensure continuity, the critique NCO observes the same squad during both the practice and live courses. He then returns to the practice course to observe another squad.

(3) *Training facility*. The training facility for the hand grenade confidence course consists of a practice grenade course for throwing the M69 practice grenades and a live grenade course for throwing fragmentation grenades. These two courses are constructed alike and close together to allow easy movement from one to the other. The hand grenade confidence course should be conducted concurrently with another 2-hour period of instruction in order to reduce terrain and personnel requirements. The breakdown for the conduct of training is as follows:

(a) Initial orientation (20 minutes).

(b) Tactical situation briefing, ammunition issue, and inspection before crossing the final coordination line (10 minutes).

(c) Practice run (35 minutes). Practice and live runs are done concurrently after the first squad completes the practice run.

(4) *Ammunition*. Each soldier needs 40 rounds of blank 5.56-mm ammunition, 40 rounds of live 5.56-mm ammunition, two M69 fuzed practice grenades, and two M67 fragmentation grenades. For each demonstration, 40 rounds of blank 5.56-mm ammunition and 2 fuzed practice hand grenades are required.

(5) *Ranges.* The range used for the confidence course consists of two separate areas, each consisting of an assembly area, a final coordination line, an initial holding area, a covering position, a throwing position, a safety officer's observation point, a final holding area, and two target areas.

(a) Assembly area. This area is used as a briefing point and an ammunition issue point. It should be a cleared area large enough to accommodate a 48- to 60-man platoon.

(b) Final coordination line. This line should be a prominent terrain feature, such as a wood line or streambed, located between the assembly area and the objective. Ideally, the area between the final coordination line and the objective should slope uphill. This is the last location outside the surface danger zone where personnel may maneuver freely without the need for cover to protect soldiers from fragmentation danger.

(c) Initial holding area. This area should be located 30 to 50 meters forward of the final coordination line. The area should be a mound or a roadside ditch that is long enough to accommodate nine men and high enough to afford protection for a kneeling man.

(d) Covering position. This position should be a mound or parapet 2 meters high and 8 meters wide across its front side. The position should be 5 meters forward of the right flank of the initial holding area.

(e) Throwing position. This position should be a mound or a parapet 1.5 meters high and 2 meters wide. The position should be located about 15 meters to the left front of the covering position.

(f) Observation point. This is the safety officer's observation point. It should be a pit affording the minimum frontal protection. The position is located 10 meters to the rear of the throwing position.

(g) Final holding area. This area should have characteristics similar to the initial holding area. The position must accommodate at least two kneeling men. It is located 5 meters to the left of the safety officer's observation point.

(h) Targets. There are three separate target areas in each course, practice and live. The target areas on the practice confidence course should be clearly marked practice targets.

- Target area 1 is the impact area for the first hand grenade. The target should be a cluster of half-inch steel E-type silhouette targets located at ranges varying from 25 to 40 meters.
- Target area 2 is the impact area for the second grenade. The target consists of a cluster of ten half-inch steel E-type silhouettes. This target should be unmarked and located at ranges varying from 25 to 40 meters and 50 meters to the left of target area one.
- Target area 3 is the target area for M16 fire. The target consists of a cluster of 15 to 20 pop-up E-type silhouettes located 50 to 100 meters from bunkers one and two.

(6) *Training area (general).* The training area should be located on slightly sloping terrain. As much natural vegetation as possible should be left on the site.

4-3. COLLECTIVE TRAINING

Two aspects of preparing for combat are training and rehearsal. When training collective tasks or rehearsing a certain combat mission, noncommissioned officers analyze the collective tasks that are to be trained and select the individual tasks that support the collective tasks. They must then integrate the individual tasks into training and rehearsals. Applicable guidelines for planning collective tasks are as follows:

a. Training managers decide which collective tasks they must practice by analyzing the operation outlines contained in the appropriate mission training plan. The operation outlines detail the collective tasks required to execute a critical wartime mission. Noncommissioned officers find the individual tasks that support the collective tasks by referring to the mission task matrix in the appropriate platoon mission training plan. They find the correct training standards in the appropriate soldier's manual task. They use the squad and platoon MTP (ARTEP 7-8-MTP) and FM 7-8 to see how to use the individual tasks to do their collective tasks.

b. As an example, the team leader learns that his platoon is going to practice for an attack training mission. He analyzes the mission outline for attack and determines which collective tasks his squad may have to do as part of this mission. Several of these tasks require soldiers to engage in close combat.

c. Soldiers can use hand grenades anytime they engage the enemy in close combat. Collective tasks that require close combat are Conduct Fire and Movement, Disengage, Knock Out Bunker, Clear a Trench, Conduct a Near Ambush, Defend, and Clear a Building. Drills that require close combat are React to Contact, Break Contact, and React to Ambush. When units train or rehearse these tasks, they should also train and evaluate the use of hand grenades. Once soldiers can safely arm and throw live fragmentation hand grenades, units should integrate the use of grenades into collective tasks rather than training it as a separate event. Use simulation or live hand grenades, as appropriate, against realistic targets while practicing the collective tasks. Noncommissioned officers tell soldiers when and how to use the grenades, evaluate their use, correct mistakes, and retrain soldiers as necessary.

4-4. SAMPLE SQUAD SITUATIONAL TRAINING EXERCISE

Present soldiers with tactical situations in an STX requiring hand grenade use in conjunction with other fire team or squad weapons that force soldiers to make sound tactical decisions on hand grenade employment.

a. The STX should be a realistic training event that improves the soldier's hand grenade throwing skills, the use of his individual weapon, and the collective skills of his fire team and squad.

b. There are no firm guidelines for an STX (Figure 4-9). Consider hand grenade tasks in the tactical scenario that are best suited to the unit's METL. The close combat tasks listed in paragraph 4-3c should also be offered in a unit's STX training program. Soldiers should carry practice hand grenades whenever they carry their individual weapons. They should be required to use both to increase their individual abilities. The use of opposing forces enhances training realism. Opposing force objectives for specific actions can be found in ARTEP 7-8-MTP.

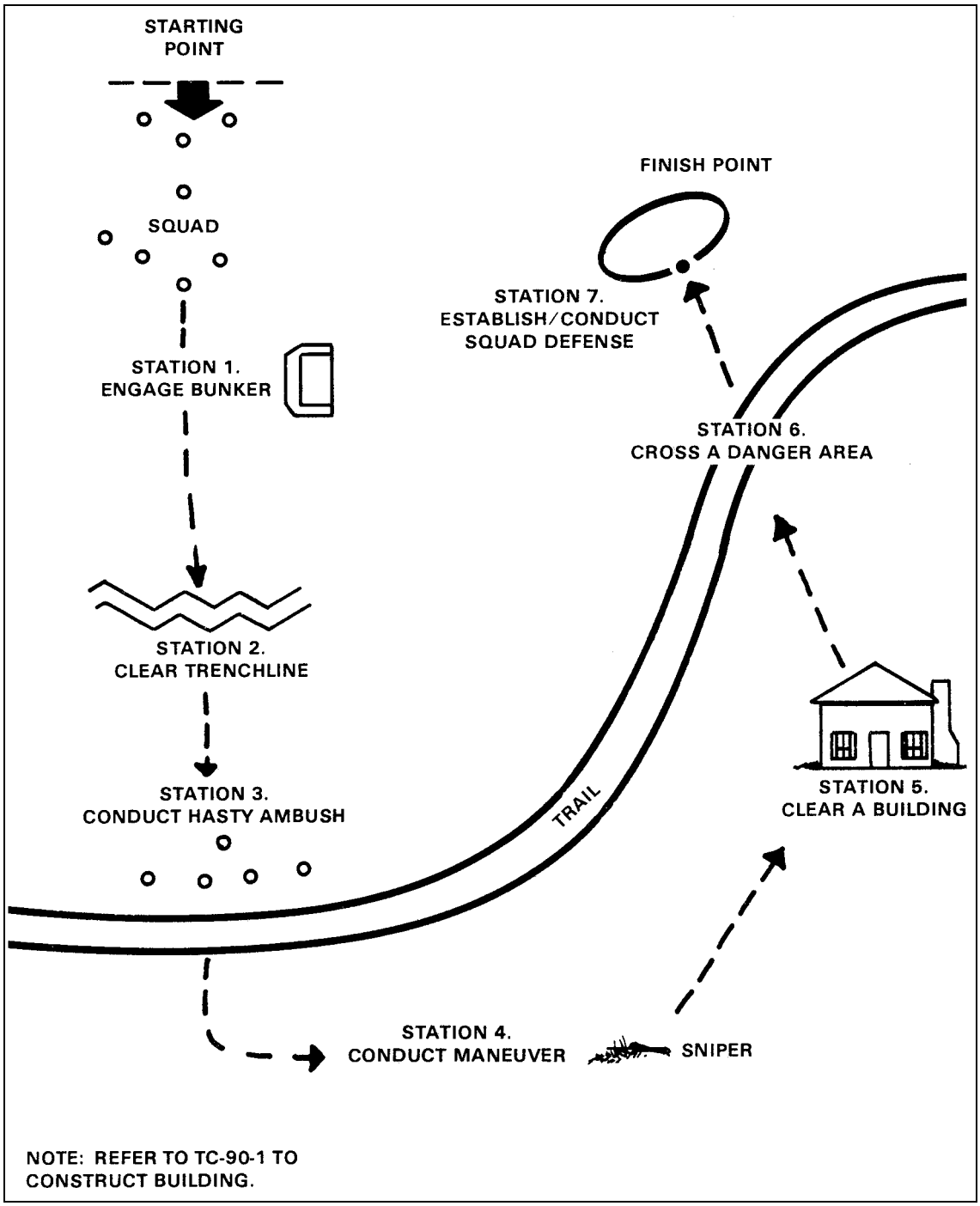

Figure 4-9. Example squad STX with hand grenades.

CHAPTER 5

GROUND PYROTECHNIC SIGNALS

Ground pyrotechnic signals are classified as either handheld or ground smoke signals. They are used for signaling and illuminating missions.

5-1. DESCRIPTION

Ground pyrotechnic signals rise to a height of 180 to 250 meters before functioning, unlike the old smoke grenades that functioned either on impact or shortly after firing. There are two types of pyrotechnic signals:

a. **Handheld Signals**. These signals are issued in their own launching mechanism and are designed to reach a minimum height of 200 meters. This group of signals includes five-star clusters, single-star parachutes, and smoke parachutes. Handheld signals have replaced all rifle-projected pyrotechnic signals and chemical grenades.

b. **Ground Smoke Signals**. These signals are self-contained units used by ground soldiers to signal aircraft or to convey information through a prearranged signal. The signal consists of a cylindrical smoke pellet, a fuze (thermalite-type ignitacord), an igniter cap, an internal retaining ring, and a striker ring assembled in an aluminum photocan container. These signals produce a smoke cloud that lasts 13 to 30 seconds. They replace rifle-projected smoke signals.

5-2. CAPABILITIES AND USES

Ground pyrotechnic signals are capable of signaling for communication or illuminating a small area.

a. **Communication**. Effective control of units on the battlefield depends largely on communication. Radio, telephone, voice, messenger, and arm-and-hand signals are communication means that may be ineffective in certain tactical situations. Pyrotechnic signals are used in such situations to supplement or to take the place of normal communication means. Pyrotechnic signals are prescribed at command level and are prearranged in accordance with SOPs.

b. **Illumination**. The illumination capabilities of pyrotechnic signals are somewhat limited because of their size. They can be used, however, to light a small area for short periods when two or more illuminating signals are used at the same time.

5-3. HANDHELD SIGNALS

Star clusters, star parachutes, and smoke parachutes are three handheld signals used by the Army.

a. **Star Clusters**. Star clusters are used for signaling and illuminating. They are issued in an expendable launcher, which consists of a launching tube and firing cap (1, 2, 3, and 4, Figure 5-1). These signals produce a cluster of five free-falling pyrotechnic stars, clusters, and smoke parachutes.

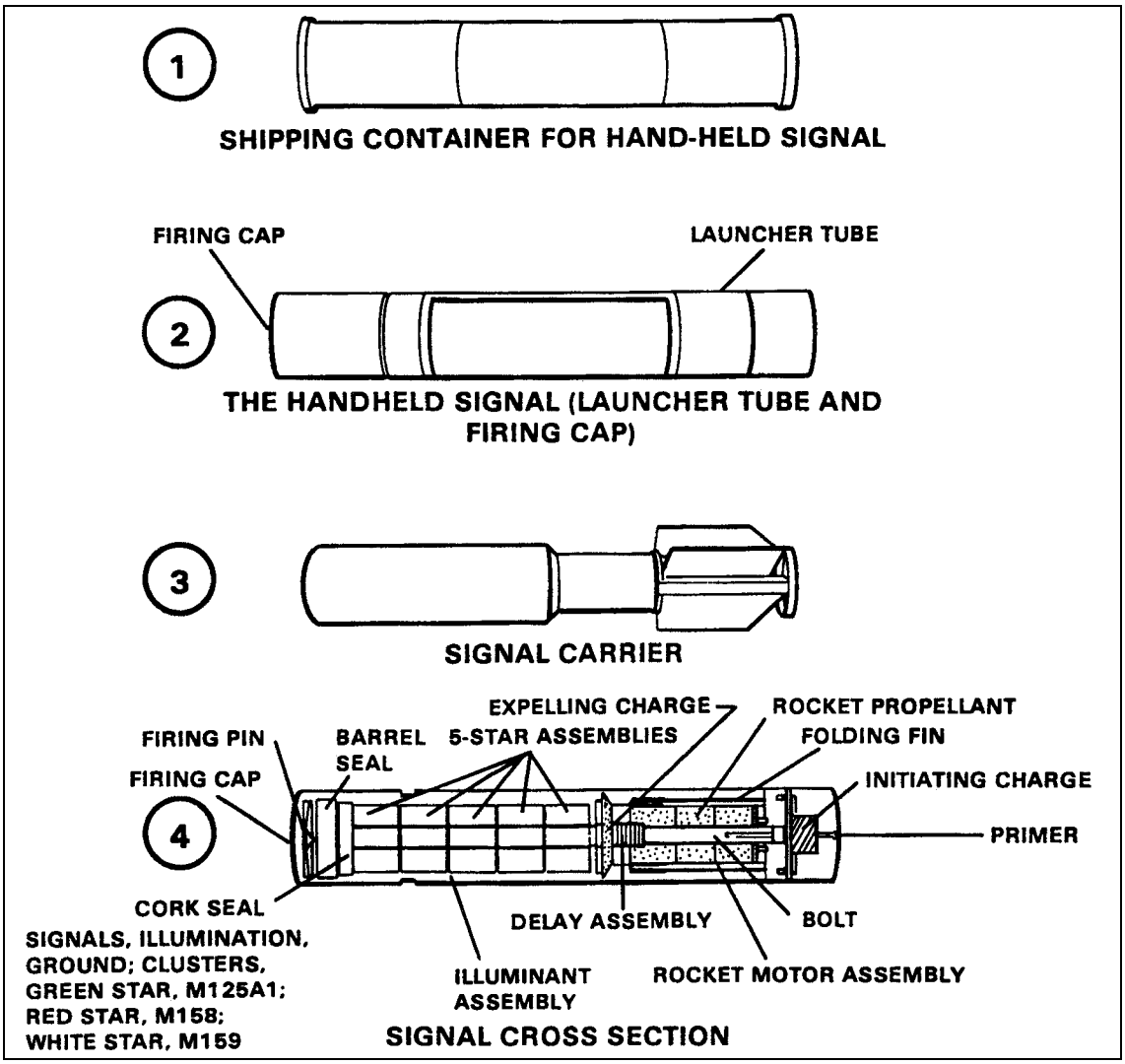

Figure 5-1. Ground pyrotechnic signals.

(1) *Types*. The current types of star clusters include the M125 and M125A1 (green star), the M158 (red star), and the M159 (white star).

(2) *Operation*. Operation of handheld signals should be as follows: (This will not always agree with the instructions found on the launcher tube. For more detailed information on safety and precautions, refer to TM 9-1370-206-10.)

(a) Hold the signal in your left hand, red-knurled band down, with your little finger in alignment with the red band (Figure 5-2).

(b) Withdraw the firing cap from the upper end of the signal.

(c) Point the ejection end of the signal away from your body and slowly push the firing cap onto the signal until the open end of the cap is aligned with the red band.

(d) Grasp the center of the signal firmly with your left hand, holding your elbow tight against your body with the signal at the desired trajectory angle and the firing cap at the bottom. Turn your head down and away from the signal to avoid injury to your face and eyes from particles ejected by the small rockets (Figure 5-2).

(e) Strike the bottom of the cap a sharp blow with the palm of your right hand or strike it on a hard surface, keeping your left arm rigid.

NOTE: Before firing the signal, the firer must make sure there is enough overhead clearance.

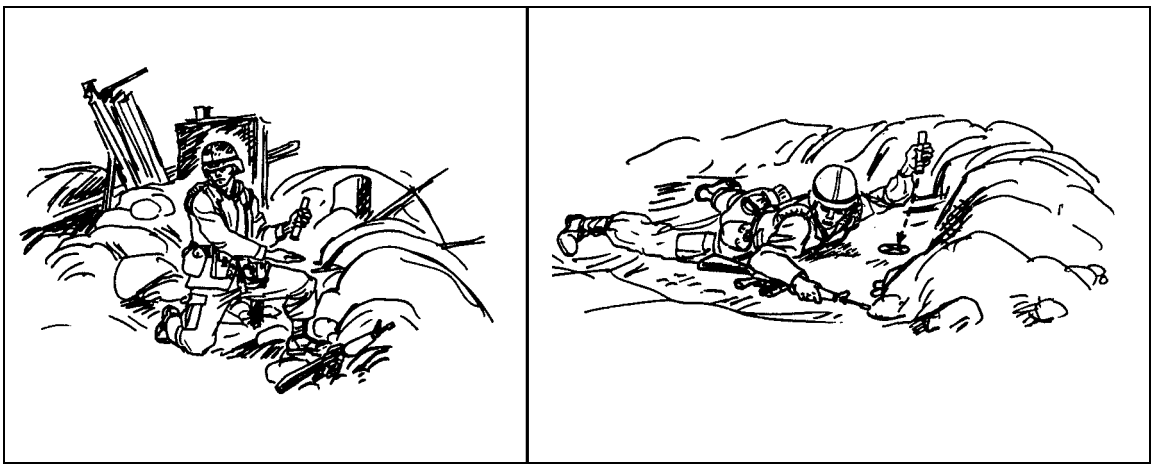

Figure 5-2. Firing the handheld signal.

(3) *Function*. When the firing cap is struck, the firing pin is forced into the base of the launcher tube at the primer. When the primer is struck, the flash from the primer ignites an initiating charge of black powder at the base of the signal. Gases from the burning initiating charge expel the signal from the launcher (rocket barrel) with a slight recoil. As the signal is expelled, four flexible steel fins unfold to stabilize the signal during flight. After the signal rises about 6 meters, the rocket motor, which was ignited by the propelling gases, begins to burn fully, forcing the signal to a height of 200 to 215 meters. At that point, a delay element ignites an ejection charge, which in turn forces the five-star illumination cluster out of the nose of the signal body.

(4) *Firing data*. Star clusters burn 6 to 10 seconds. Their rate of descent is 14 meters each second.

b. **Star Parachutes**. Star parachutes are also used for signaling and illuminating. They are issued in an expendable launcher that consists of a launching tube and a firing cap. These signals produce a single parachute-suspended illuminant star.

(1) *Types*. The current types of star parachutes include the M126A1 (red star), the M127A1 (white star), and the M195 (green star).

(2) *Operation*. These signals are fired in the same manner as the star clusters.

(3) *Function*. These signals function in the same manner as the star clusters.

(4) *Firing data*. The M126- and M127-series star parachutes rise to a height of 200 to 215 meters. The M126 burns for 50 seconds, and the M127 burns for 25 seconds. The average rate of descent for either is 2.1 meters each second. The signals can be seen for 50 to 58 kilometers at night.

c. **Smoke Parachutes**. Smoke parachutes are for signaling only. They are issued in an expendable launcher that consists of a launching tube and a firing cap. These signals produce a single perforated colored smoke canister that is parachute-suspended.

(1) *Types*. The current types of smoke parachutes include the M128A1 (green smoke), the M129A1 (red smoke), and the M194 (yellow smoke).

(2) *Operation*. These signals are fired in the same manner as the star clusters.

(3) *Function*. These signals function in the same manner as the star clusters.

(4) *Firing data*. Smoke parachutes rise to a height of 200 to 215 meters. The signals emit smoke for 6 to 18 seconds, forming a smoke cloud that persists for 60 seconds. Their rate of descent is 4 meters each second.

5-4. SURFACE TRIP FLARES

Surface trip flares outwardly resemble antipersonnel mines or hand grenades (Figure 5-3). Their primary use is to warn of infiltrating troops by illuminating the field. They are also used as signals or booby traps. The flares produce 50,000 candlepower of illumination.

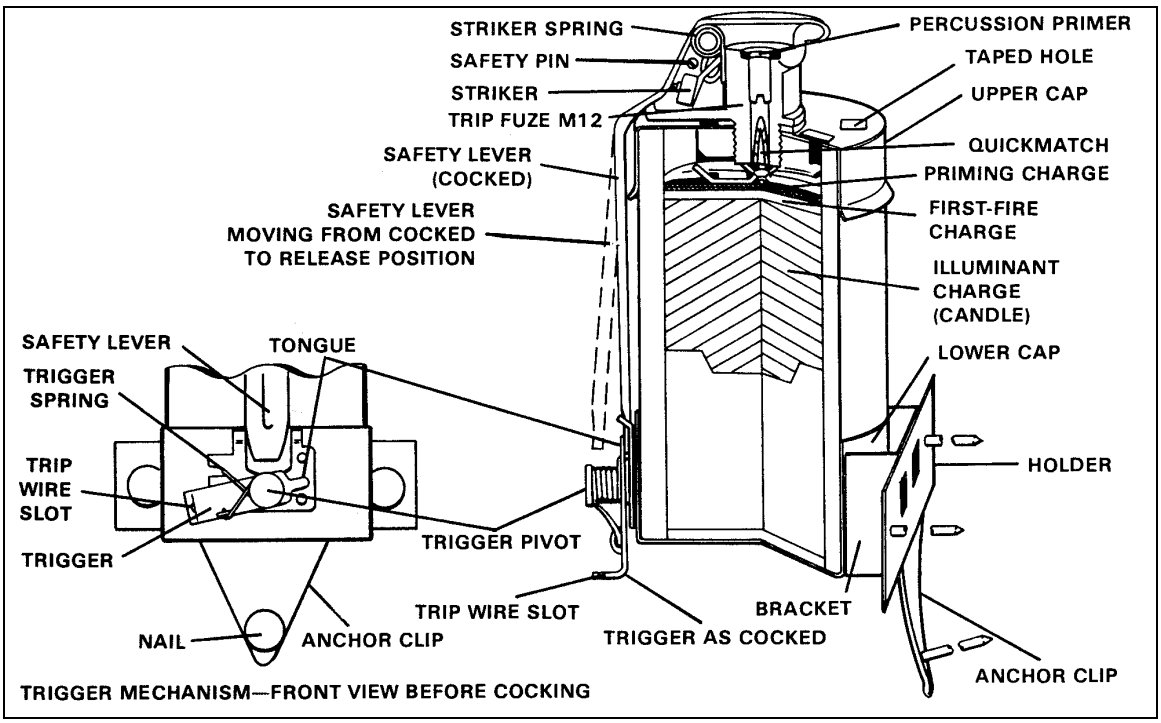

Figure 5-3. Surface trip flares.

5-5. SIMULATORS

Simulators are used in training to imitate the sounds and effects of combat detonations.

a. The booby trap simulator, M117, (Figure 5-4) is used during training and military exercises. This device allows training in the installation and use of booby traps. When tripped or activated, the simulator functions with a flash and loud report.

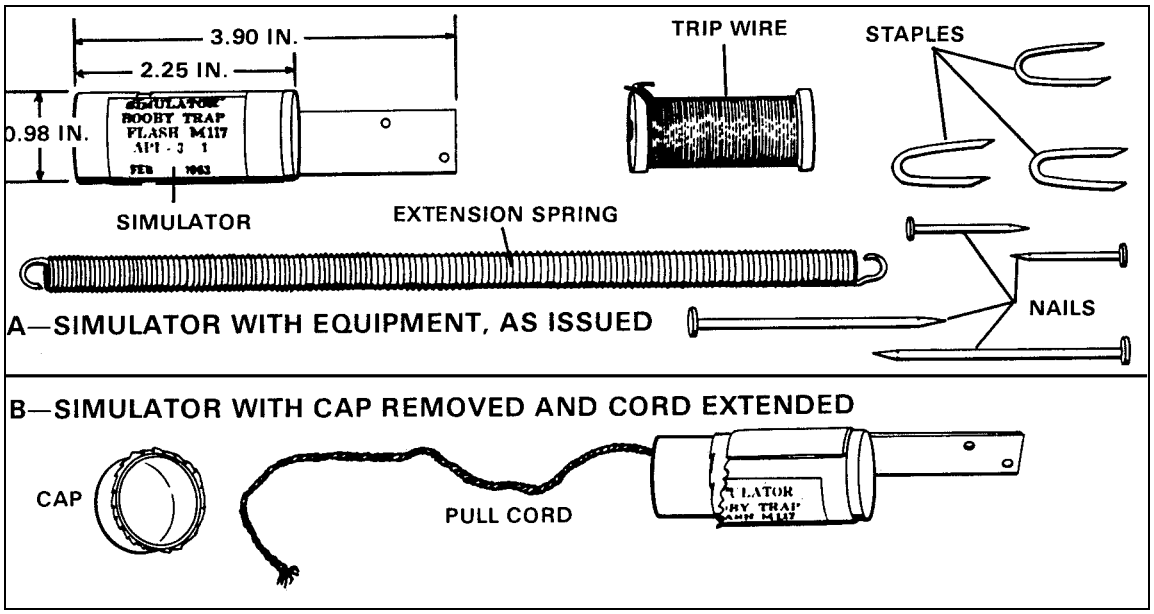

Figure 5-4. M117 simulator.

b. The ground burst simulator, M115A2, (Figure 5-5) is used to create battle noises and flash effects during training. It produces a high-pitched whistle that lasts 2 to 4 seconds. The detonation produces a flash and loud report.

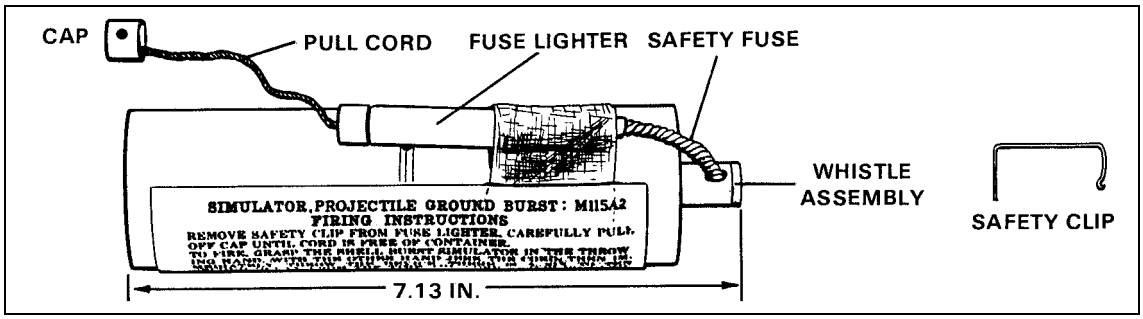

Figure 5-5. M115A2 simulator.

c. The hand grenade simulator, M116A1, (Figure 5-6) is used to create battle noises and flashes during training. It differs from the ground burst simulator in that it is shorter and does not emit a high-pitched whistle before detonation. The hand grenade simulator is thrown in the same manner as a live grenade. It creates a flash and loud report 5 to 10 seconds after ignition.

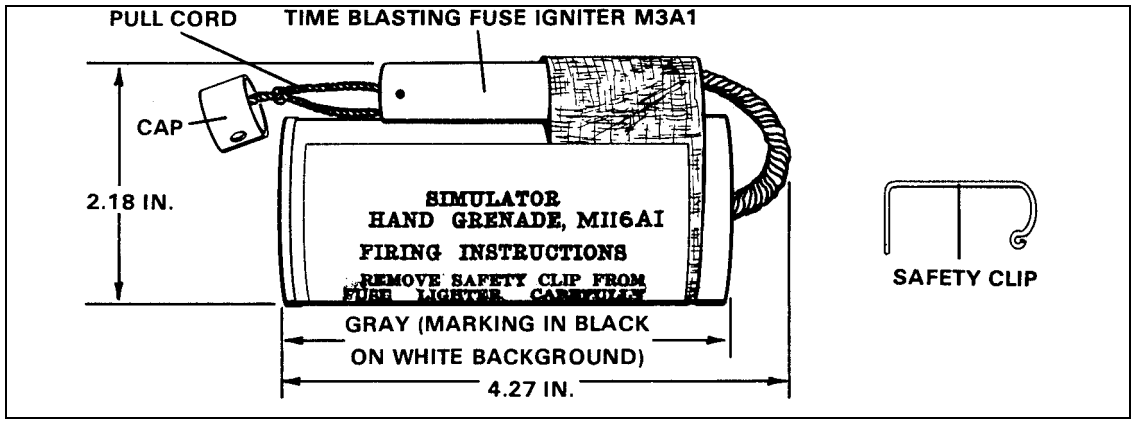

Figure 5-6. M116A1 simulator.

d. The explosive simulator, M80, (Figure 5-7) is used during training and in deactivation training programs. It simulates hand grenades, booby traps, land mines, and rifle or artillery fire.

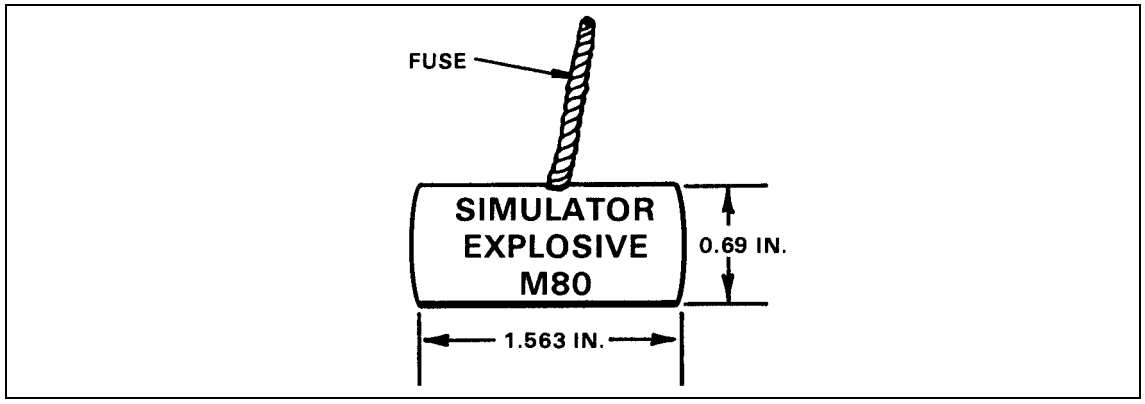

Figure 5-7. M80 simulator.

5-6. ILLUMINATION GROUND SIGNAL KITS

The pen gun flare supports the small unit leader in fire control, maneuver, and initiating operations such as ambushes.

a. **Kit 1**. This pen gun flare has a threaded projector with the projectiles contained in a cloth bandoleer. Each of the signals listed below may be fired from a handheld projector while in a bandoleer.

- Red illumination ground signal, M187.
- White illumination ground signal, M188.
- Green illumination ground signal, M189.
- Amber illumination ground signal, M190.

(1) *Contents*. The projector and the bandoleer plus seven projectiles or signals make up the signal kit (Figure 5-8). All signals may be obtained and fired separately. The M185 red signal kit contains only red signals. The M186 signal kit contains three red, two white, and two green signals.

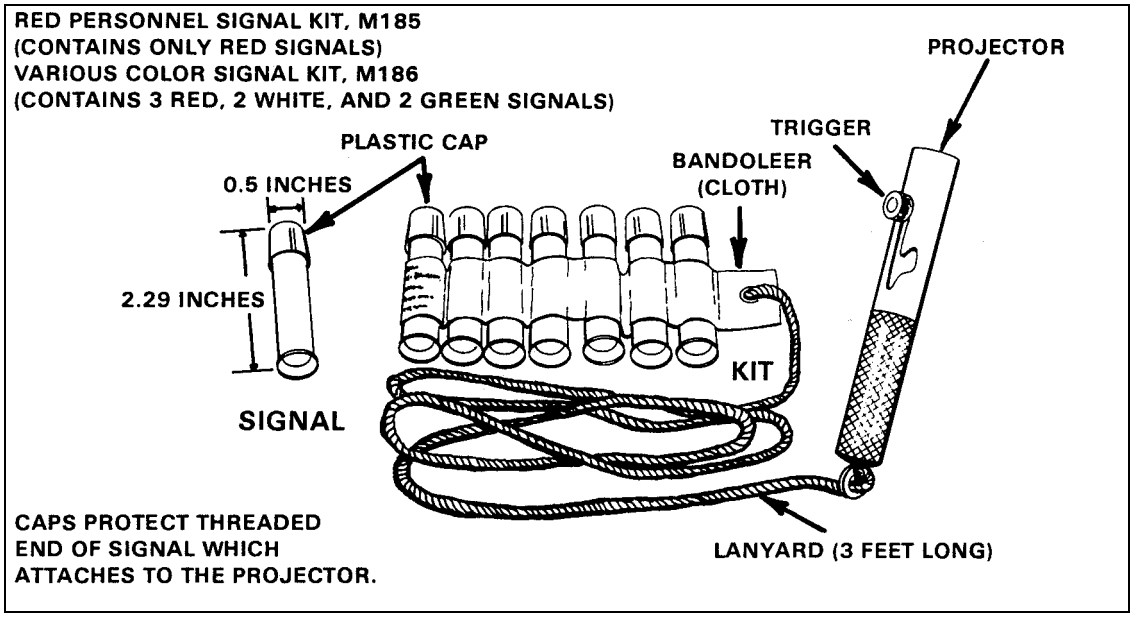

Figure 5-8. Signal kit 1.

(2) *Operation*. Select the signal to be fired by color. If the bandoleer contains more than one signal of the chosen color, use the one farthest from the lanyard. Remove and discard the plastic cap. Cock the projector by moving the trigger to the safety slot. Carefully thread the projector onto the signal, taking care not to dislodge the trigger from the safety slot. Aim in the chosen direction. Fire by moving the trigger to the bottom of the slot and releasing it with a snap. If the expended signal is on the end of the bandoleer or if the signals between the expended signal and the end have been used, cut the bandoleer and discard the waste. Return the partly used kit to the barrier bag and seal with tape.

b. **Kit 2**. This pen gun flare has a force-fitted projector and a plastic bandoleer before being fired.

(1) *Contents*. This kit contains only red illumination ground signals. The projector and the bandoleer plus seven signals make up this kit (Figure 5-9). The burning time for these signals is 10 seconds at 100,000 candlepower.

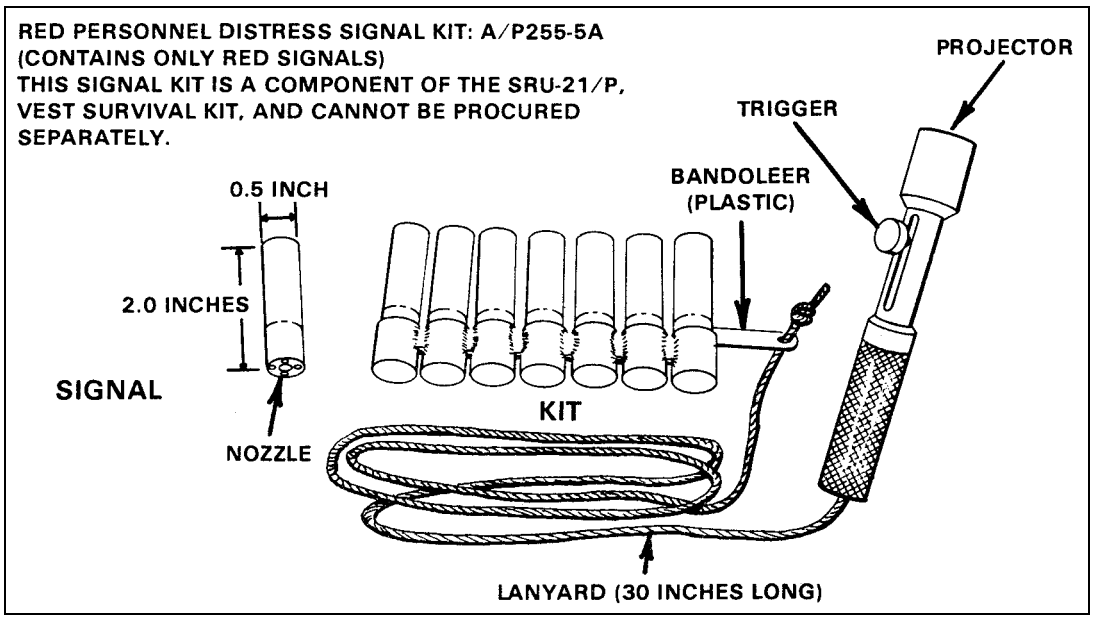

Figure 5-9. Signal kit 2.

(2) *Operation*. To operate this signal, select and remove the signal to be fired from the bandoleer using the one farthest from the lanyard. Carefully insert the nozzle end of the signal into the projector as far as it will go. Fire by pulling the trigger knob to the rear of the slot and releasing it with a snap. Retain the bandoleer for future use. Return the partly used kit to the plastic bag and seal with tape.

APPENDIX A

LIVE HAND GRENADE RANGE OPERATIONS CHECKLIST

This appendix is designed to assist leaders in the safe operation of a basic live hand grenade range. As a checklist, it does not provide the answers but asks the questions for leaders to answer. Modification of the checklist for other types of live hand grenade training (collective training, STX, and so forth) is expected. The following is a suggested checklist:

A-1. BECOME AN EXPERT

- Review written material.
- Review AR 385-63.
- Review FM 23-30 and TM 9-1330-200-12.
- Check out the range.
- Visit range control and read installation range instructions.

A-2. DETERMINE REQUIREMENTS

- Personnel.
- OIC.
- Safety officer.
- Assistant safety officer.
- NCOIC.
- Ammunition personnel.
- Target detail.
- Tower operator.
- Assistant instructors.
- RATELOs.
- Guards, as required.
- Aidmen, with required medical supplies.
- Truck driver.

A-3. EQUIPMENT

- Kevlar, body armor, LCE, and earplugs issued to all personnel, instructors, and students.
- Range packet and clearance form.
- Safety fan and diagram.
- Appropriate publications pertaining to training (FMs, TMs, ARs).
- Lesson plans, status reports, and reporting folders.
- Range flag.
- Communications equipment to include a phone, FM radios, and field radios; two means of communication are required.
- PA system with bullhorns for backup.

- Kevlars marked for control personnel.
- Ambulance or required dedicated evacuation vehicle; the driver must have knowledge of the route to the hospital.
- Earplugs for all personnel; have extras on hand for visitors.
- Water for drinking and cleaning.
- Qualification scorecards.
- Tables and chairs, if needed.
- Training aids.
- Targets required for the operation of the range (bunkers or personnel targets 1/4-inch steel E-type silhouette).

A-4. OCCUPY, INSPECT, AND SET UP RANGE

- Establish good communication by at least two means.
- Have designated parking areas for cadre and training unit personnel.
- Have secured ammunition points.
- Establish locations for medical station.
- Establish water points.
- Have a designated mess area.
- Have a designated helipad.
- Inspect range for operational conditions.
- Make sure the impact area is raked and clear of debris.
- Check all throwing pits for sharp edges or unleveled throwing surfaces.
- Check to ensure knee walls meet standards.
- Check tower and tower PA system.
- Raise the red flag when occupying or firing, according to local SOP.
- Request an opening code from range control.

A-5. PREPARATION FOR TRAINING

- Get a good head count of all soldiers going to train.
- Identify soldiers who will not be training.
- Issue equipment and ammunition necessary to conduct training.
- Conduct safety briefing to include administrative personnel.
- Organize personnel into throwing orders.

A-6. CONDUCT INITIAL HAND GRENADE TRAINING

- Move soldiers to training location.
- Issue practice grenades to soldiers.
- Show soldiers inspection procedures when unpacking hand grenades.
- Show soldiers composure of grenade, for example, body, fuze, and three safeties.
- Teach soldiers proper left and right handgrips.
- Teach soldiers proper throwing positions and techniques.
- Let soldiers practice throwing grenades, 10 or more as required for efficiency.

A-7. INSPECTION OF LIVE HAND GRENADES

- Open the canister and visually inspect the grenade.
- If grenade is packed upside down, turn in grenade. (See TM 9-1330-200-12.)
- If safety pin or safety clip is missing, turn in grenade.
- If all the above is in order, remove grenade from canister.
- If grenade body is cracked, turn in grenade.
- If fuze lugs are broken, turn in grenade.
- If safety lever is bent or broken, turn in grenade.
- The safety pin must have either a diamond crimp or a 45-degree spread; if not, turn in grenade (TM 9-1330-200-12).
- If pull ring is cracked, turn in grenade.
- If fuze is loose, turn in grenade.

A-8. MOVEMENT TO LIVE-BAY TRAINING AREA

Soldiers are briefed to prepare to move down to the live-bay throwing site. Individual weapons and protective masks are grounded in the designated training unit area of operation. Range cadre ensure soldiers have earplugs, flak vest, LCE, and Kevlar. Soldiers also ensure that all equipment is properly worn and fastened. Before marching the soldiers to the live-bay site, a last minute check is made to make sure any high-risk soldier is identified in the initial training period and is pulled out of the formation.

a. **Safety Precautions**.

(1) After soldiers go past the prescribed roadblocks and or barriers, make sure a guard is posted and briefed on procedures for individuals wanting to cross roadblocks during live throwing of grenades.

(2) Communication between roadblock and tower must be confirmed before live throwing.

(3) Soldiers are shown the live-bay training area and a safety briefing is given on the operating procedures of live bay. Cadre reinforce the fact that cooking-off and milking of hand grenades are not allowed in live bay. Soldiers are also briefed on the procedures for dropping grenades.

(4) After the live-bay safety briefing, march the soldiers to the overhead cover area.

(5) Soldiers are checked once more to ensure all have earplugs and equipment is properly secured.

b. **Issue of Live Hand Grenades**.

(1) Issue grenades to the soldiers making sure they are holding the grenades using a proper left or right handgrip. Grenades are issued only to those soldiers who are next in line to go to the throwing pit. The safety NCO makes sure the soldiers are holding the grenades properly and at the chin-chest level.

(2) When departing to the live-bay pit, the safety officer directs soldiers to sound off, each indicating with which hand he will throw the grenade.

A-9. THROWING OF LIVE HAND GRENADES

Throwing of live hand grenades can be done in a safe manner if the range safety procedures are followed. These procedures include identification of high-risk soldiers as well as reinforcement of training to those soldiers who may have had problems during the initial training block of instruction. Live-bay cadre must be completely alert at all times and prepared to take appropriate actions for any given situation. The following is guidance for operation procedures of live-bay throwing.

- The range OIC must be positioned in the tower to observe the throw phase and count grenade explosions for purposes of grenade accountability and duds.
- A pit NCO is assigned to each throwing pit.
- The safety NCO issuing grenades directs soldiers to specific throwing pits.
- The pit safety NCO observes movement of soldiers to the pit.
- The soldier identifies the throwing arm to the pit safety NCO.
- The pit safety NCO directs the soldier to the appropriate position of the pit, based on left or right throwing arm.
- The pit NCO directs the soldier to hand over the grenade in his nonthrowing hand.
- The pit safety NCO directs the soldier to remove the safety clip and prepare to throw. From this point on, the pit safety NCO does not remove his eyes from the throwing hand until completion of the throw. The pit safety NCO signals the tower that the soldier is prepared to throw by holding up his left or right arm in a vertical position.

WARNING

If a grenade is dropped in the pit, the pit safety NCO forces the soldier out of the pit into the designated safe area and follows him.

A-10. ORDER TO THROW FROM TOWER

- When all throwing pits are ready, the tower NCO commands THROW, and the pit NCO repeats the THROW command to the soldier in the pit.
- All pits throw at the same time.
- The soldiers throw the grenades, then drop to cover. If the soldier does not take cover, the pit NCO forces the soldier to take cover if needed.
- The tower NCO commands CLEAR after observing each grenade detonate.
- The soldiers prepare to throw a second grenade, repeating the required steps.

WARNING

If a soldier releases the safety lever but fails to throw the grenade, the pit safety NCO forcefully repeats the command to throw; if necessary, the pit safety NCO grabs and throws the grenade himself.

A-11. COMPLETE THE TRAINING MISSION

- Clear the range.
- Close down the range in accordance with local SOP.
- Remove all equipment and ammunition from the range.
- Police the range, fill in all holes with sand, rake the impact area, and perform other range maintenance as required by local SOP.
- Request a range inspection from range control when ready to clear.
- Turn in paperwork and equipment.
- Submit after action report to headquarters.
- Report any noted safety hazards to proper authorities.
- Turn in all unexpended grenades in original grenade containers to the ASP, along with all safety pins and packing residue from all detonated grenades.

APPENDIX B
HAND GRENADE SAFETY CONSIDERATIONS

As simple as the fragmentation hand grenade may seem, it is a very powerful and dangerous weapon. Soldiers must understand the fatal effects that might take place with a hand grenade training accident. Since 1990, a number of fatal accidents have happened throughout training areas within the US. These training accidents have been recorded with basic training soldiers as well as seasoned soldiers within our armed forces. This appendix lists precautions and other considerations to be followed by hand grenade users. It should be used with Appendix A, Live Hand Grenade Range Operations Checklist, to educate leaders to safely conduct hand grenade training.

B-1. GENERAL PRECAUTIONS

Observe general precautions applicable to the use of any ammunition. More specific instructions to grenade users include the following:

a. Do not open the grenade containers or remove the protective devices until just before use.

b. Never make unauthorized modifications to hand grenades.

c. Do not remove the safety clip or the safety pin until the grenade is about to be thrown.

(1) A safety clip can be removed and reattached to a hand grenade if the safety pin is still in place.

(2) Never attempt to reinsert a safety pin into a bursting hand grenade during training. In combat, however, it may be necessary to reinsert a safety pin into a bursting grenade. Take special care to replace the pin properly. If the tactical situation allows, it is safer to throw the grenade rather than to trust the reinserted pin. Safety pins may be replaced in smoke and burning riot-control grenades.

B-2. TRAINING PRECAUTIONS

Treat any thrown grenade that fails to detonate as a dud, regardless of safety pin, safety clip, or safety lever status.

a. Know the status of the grenade.

(1) SAFE—a grenade with all safety devices intact.

(2) LIVE—a thrown grenade from the instant it is released until the expected fuze time has elapsed.

(3) DUD—a thrown grenade that failed to detonate after the expected fuze time has elapsed.

b. During training, the pit NCO determines a dropped grenade's status (safe, live, or dud).

c. Throwers must consider the flight path of the grenade to make sure no obstacles alter the flight of the grenade or cause it to bounce back toward them.

d. Make sure that the impact area is level and free of debris before throwing the casualty-producing hand grenade in training.

e. Do not handle, approach, recover, or otherwise tamper with dud grenades. Explosive ordnance disposal (EOD) personnel handle dud grenades.

f. Observe caution when using hand grenades with igniting type fuzes (M14-TH3, AN-M18, M7A2/A3, and AN-M83). These grenades ignite with a flash and should be thrown at least 10 meters from all personnel to avoid hazardous conditions.

B-3. DUDS

Duds must be regarded as dangerous. The following procedures must be followed if a grenade does not detonate:

a. **M69 Practice Grenade**. Wait 5 minutes before defuzing the M69 practice grenade. Keep the bottom of the grenade oriented in a safe area. Place the dud fuze in a sand-filled container and return it to the issuing facility.

b. **Fragmentation Grenade**. The thrower and supervisor wait in the throwing pit for 5 minutes before returning to a covered area. Notify EOD immediately. Do not throw any hand grenades into the area of the dud until it has been neutralized. If range facilities provide, continue training on adjacent impact area separated by berms.

B-4. DROPPED LIVE HAND GRENADES

If a casualty-producing grenade is dropped accidentally after the safety pin has been removed, the throwing pit safety NCO is responsible for reacting accordingly. He is responsible for the safety of the thrower, and he decides what actions are the most appropriate. His actions are dependent upon many factors, such as the safety design of the throwing pit, the location of the dropped grenade, the location of the thrower, and possibly his ability to physically move the thrower. All of these factors need to be considered before the safety pin is pulled.

a. **Throwing Pit With Knee Wall**. It is recommended that all throwing pits for live grenade training have knee walls (Figure B-1). Knee walls provide the quickest and safest means of reacting to a dropped grenade. In most instances, the throwing pit safety NCO reacts to a dropped live grenade by yelling GRENADE to alert all other personnel in the area and by physically pushing the thrower over the knee wall, then falling on top of him. If a hand grenade is dropped over the knee wall, the throwing pit safety NCO yells GRENADE and forces the thrower to the ground inside the throwing pit.

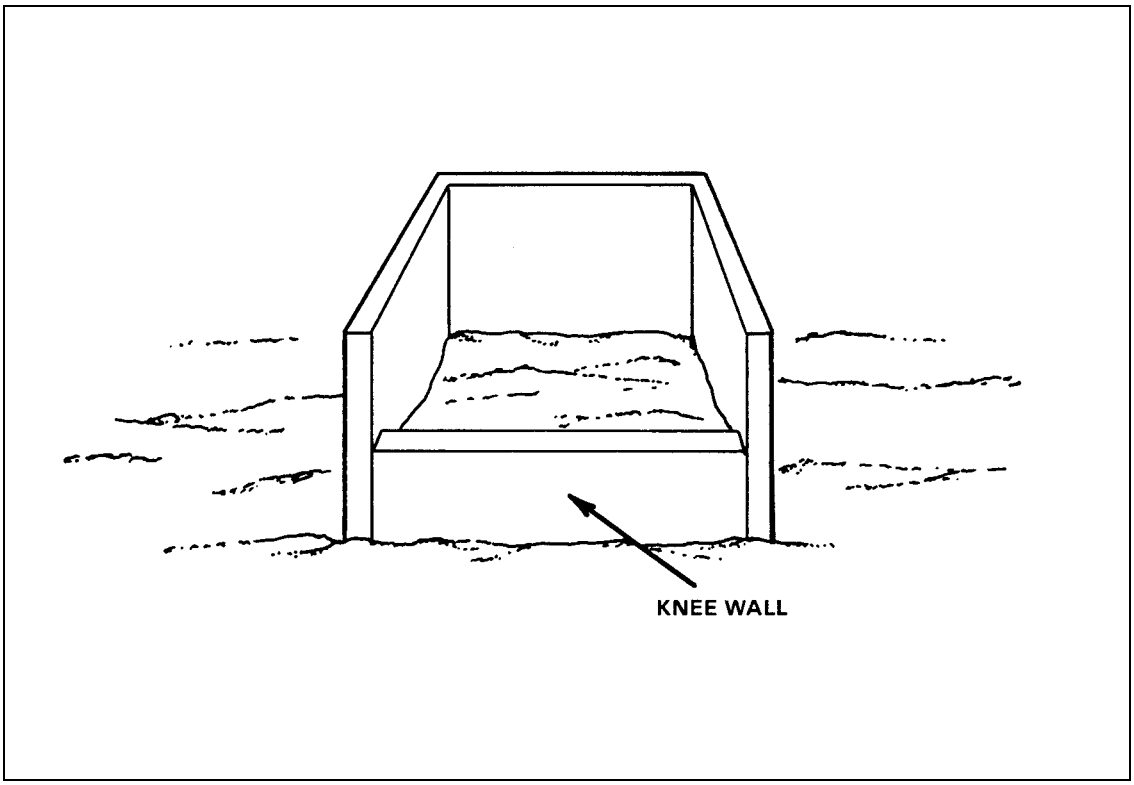

Figure B-1. Throwing pit with knee wall.

b. **Throwing Pit Without Knee Wall**. Throwing pits that do not have knee walls must have safety pits attached to both sides (Figure B-2). In most instances, the throwing pit safety NCO reacts to a dropped live grenade by yelling GRENADE to alert other personnel in the area and by physically moving the thrower out of the throwing pit and into a safety pit. If the hand grenade is dropped to the rear of the throwing pit, the throwing pit safety NCO yells GRENADE and forces the thrower over the front of the throwing pit. He follows the thrower over the wall. The safety NCO's first responsibility is the thrower's safety. His immediate action must be to remove the thrower from the danger area.

c. **Sumps**. Do not kick or throw grenades into sumps. In response to a dropped grenade, soldiers move from the danger area and drop to the prone position with Kevlars facing the direction of the grenade. This reduces the soldiers' exposure and increases the protection of the Kevlars.

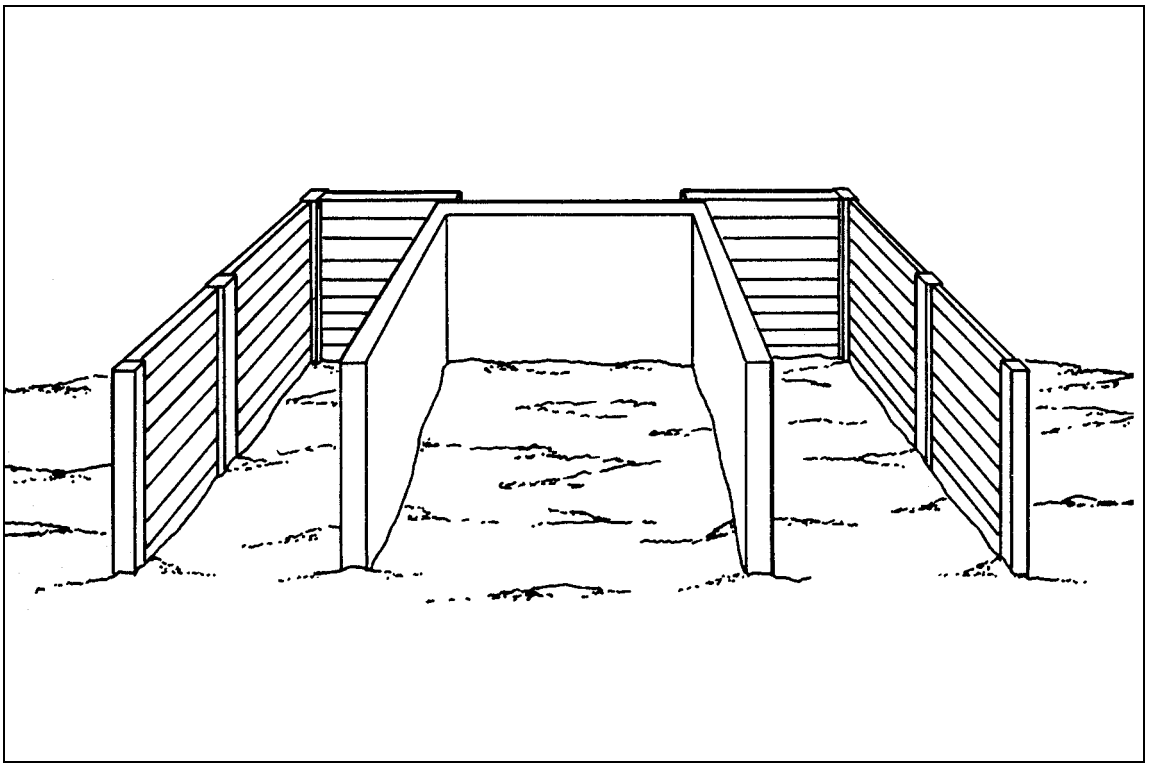

Figure B-2. Throwing pit with safety pits.

B-5. PROPER GRIP

Hold the safety lever firmly. An insufficient grip on the safety lever could result in the striker rotating and striking the primer that ignites the delay element. This can occur on most grenades without the safety lever being detached from the grenade.

B-6. HELICOPTERS

Do not throw fragmentation grenades from low flying or hovering helicopters. The fragments present a hazard to the aircraft and its passengers. Generally, throwing hand grenades from medium- or high-flying helicopters is limited to mission-critical situations.

B-7. AIRBORNE

During training missions, do not attach hand grenades on ammunition pouches during airborne operations. Carry the grenades in the main body of the rucksack instead. During wartime conditions, it is essential that soldiers are prepared to engage the enemy as soon as the chopper hits the ground; therefore, soldiers must carry their grenades in their ammunition pouches with the secondary safety removed. The following are suggested techniques to be used during training missions.

a. Before removing grenades from canisters, make sure inspection procedures are followed IAW TM 9-1330-200-12. Remove grenades from canisters and tape the safety pin and safety lever to the grenade. Fold back the tape for a quick release.

b. Return grenades to the canister for carrying. When taking out grenades, inspect them again to make sure tape and safeties are intact.

B-8. ENVIRONMENTAL PROTECTION

All leaders, trainers, and soldiers must comply with environmental laws and regulations. The leader must identify the environmental risks associated with training individual and collective tasks. Trainers must work to reduce and avoid damage to training areas and environment caused by realistic training. Environmental risk management parallels safety risk management and is based on the same philosophy. Environmental risk management consists of the following steps:

a. **Identify Hazards**. Identify the potential sources for environmental degradation during the analysis of METT-T factors. This requires identification of environmental hazards. An environmental hazard is a condition with the potential for polluting air, soil, or water or destroying cultural or historical artifacts.

b. **Assess Hazards**. Analyze the potential severity of environmental degradation by using the environmental risk assessment matrixes in FM 3-100.4 and the example risk management worksheet shown in Figure B-3. The severity of environmental degradation is considered when determining the potential effect an operation may have on the environment. The risk effect value is defined as an indicator of the severity of environmental degradation. Quantify the risk to the environment resulting from the operation as extremely high, medium, or low using the environmental assessment matrixes.

c. **Make Environmental Risk Decisions**. Make decisions and develop measures to reduce high environmental risks.

d. **Brief Chain of Command**. Brief the chain of command (to include installation environmental office, if applicable) on proposed plans and pertinent high-risk environmental matrixes. Risk decisions are made at a level of command that corresponds to the degree of risk.

e. **Implement Controls**. Implement environmental protection measures by integrating them into plans, orders, SOPs, training performance standards, and rehearsals.

f. **Supervise**. Supervise and enforce environmental protection standards.

RISK MANAGEMENT WORKSHEET

Operation/Training Event: MALONE 1 (HAND GRENADES) **Page 1 of 9**
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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
1(A). RANGE/ GENERAL SITUATIONAL AWARENESS				**THE RANGE OFFICER IN CHARGE (OIC)/SAFETY OFFICER (RSO) WILL DO THE FOLLOWING**: 1. READ AND REVIEW THE RISK ASSESSMENT. 2. ENSURE CADRE COMBAT LIFESAVERS AND A DEDICATED EVACUATION VEHICLE ARE AVAILABLE. INVENTORY COMBAT LIFESAVER'S FIRST AID BAG OF THE TRAINING COMPANY. CONSULT WITH TRAINING COMPANY CADRE TO IDENTIFY PROBLEM SOLDIERS – SUICIDAL OR HOMICIDAL INTENT OR GESTURES, OR DEMONSTRATION OF SERIOUS EMOTIONAL ADJUSTMENTS. 3. IDENTIFY SOLDIERS WITH MEDICAL PROBLEMS HAVING THE POTENTIAL TO IMPACT TRAINING TO INCLUDE MINOR ILLNESSES, ALLERGIES, PREVIOUS HEAT AND/OR COLD WEATHER INJURIES, OR ENVIRONMENTAL SENSITIVITIES. 4. REVIEW EVACUATION PROCEDURES AND REPORTING PROCEDURES FOR SERIOUS INCIDENTS. PLAN TO EVACUATE SOLDIERS WITH ALLERGIC REACTIONS, ANYONE WITHIN 25 METERS OF A LIGHTNING STRIKE, COLD WEATHER/HEAT INJURIES, SNAKEBITE, OR ANYONE SHOWING SYMPTOMS BEYOND THE RANGE OIC'S EXPERIENCE AND THE COMBAT LIFESAVER'S ABILITY TO TREAT. THE OIC/RSO WILL DIRECT AN AIR MEDEVAC WHEN THE DANGER OF LOSS OF LIFE, LIMB, OR EYESIGHT EXISTS. 5. ASCERTAIN WHAT TYPE OF TRAINING THE UNIT HAS DONE FOR THE PREVIOUS 24 HOURS AND THE AVERAGE AMOUNT OF REST THE SOLDIERS HAVE BEEN ALLOWED. 6. CONDUCT DAILY RISK ASSESSMENT IN CONSULTATION WITH TRAINING COMPANY CADRE REPRESENTATIVES.			

INITIAL OVERALL RISK: **EXTREMELY HIGH** **HIGH** **MEDIUM** **LOW** **RISK ACCEPTANCE: Type signature block, and sign.**

RESIDUAL OVERALL RISK: **EXTREMELY HIGH** **HIGH** **MEDIUM** **LOW**

_____	_____	_____	_____
ARDRELLE L. EVANS CPT, IN Commanding	GORDON B. DAVIS, JR. LTC, IN Commanding	RICHARD J. ROWE, JR. COL, IN Commanding	CARL F. ERNST MAJOR GENERAL, USA Commanding

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Figure B-3. Example of risk management worksheet.

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
1(B). HEAT.	D REMOTE	I CATASTROPHIC	HIGH	1. THE TRAINING UNIT WILL MONITOR WET BULB FOR HEAT CATEGORY. PREVIOUS HEAT INJURIES WILL BE MONITORED THROUGH THE BUDDY SYSTEM, TRAINING COMPANY CADRE, AND INSTRUCTORS. 2. HEAT CATEGORIES WILL BE ENFORCED AS FOLLOWS: HEAT CAT / WBGT INDEX F / EASY WORK / EASY WATER / MODERATE WORK / MODERATE WATER / HARD WORK / HARD WATER 1 / 78-81.9 / NL / ½ / NL / ¾ / 40/20 / ¾ 2 / 82-84.9 / NL / ½ / 50/10 / ¾ / 30/30 / 1 3 / 85-87.9 / NL / ¾ / 40/20 / ¾ / 30/30 / 1 4 / 88-89.9 / NL / ¾ / 30/30 / ¾ / 20/40 / 1 5 / >90 / 50/10 / 1 / 20/40 / 1 / 10/50 / 1 **EASY WORK** • WEAPON MAINTENANCE • WALKING HARD SURFACE AT 2.5 MPH, 30 LB LOAD • MANUAL OF ARMS • MARKSMANSHIP TRAINING • DRILL AND CEREMONY **MODERATE WORK** • WALKING LOOSE SAND AT 2.5 MPH, NO LOAD • WALKING HARD SURFACE AT 3.5 MPH, LESS THAN 40 LB LOAD • CALISTHENICS • PATROLLING • INDIVIDUAL MOVEMENT TECHNIQUES, I.E., LOW CRAWL, HIGH CRAWL • DEFENSIVE POSITION CONSTRUCTION • FIELD ASSAULTS **HARD WORK** • WALKING HARD SURFACE AT 3.5 MPH, MORE THAN 40 LB LOAD • WALKING LOOSE SAND AT 2.5 MPH WITH LOAD 3. DAILY WATER INTAKE SHOULD NOT EXCEED 12 QTS. 4. EVACUATE HEAT CASUALTIES IN ACCORDANCE WITH SERIOUS INCIDENT GUIDELINES/POST REQUIREMENTS.	E UNLIKELY	I CATASTROPHIC	MEDIUM

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Figure B-3. Example of risk management worksheet (continued).

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
1(C). COLD	E UNLIKELY	I CATASTROPHIC	MEDIUM	1. ALL SOLDIERS WITH PREVIOUS COLD INJURIES WILL BE IDENTIFIED AND CLOSELY MONITORED THROUGH THE BUDDY SYSTEM, TRAINING COMPANY CADRE, AND INSTRUCTORS. 2. **IMMERSION FOOT:** CAUSE: PROLONGED IMMERSION IN COLD WATER, USUALLY IN EXCESS OF 12 HOURS AT TEMPERATURES BELOW 50 DEGREES F. 3. **TRENCH FOOT:** CAUSE: EXPOSURE TO WETNESS AND COLD BETWEEN FREEZING AND 50 DEGREES FAHRENHEIT, LASTING HOURS TO SEVERAL DAYS. 4. **FROST BITE:** CAUSE: EXPOSURE TO COLD AT TEMPERATURES OF FREEZING OR BELOW, FOR MINUTES TO SEVERAL HOURS. 5. **HYPOTHERMIA:** CAUSE: HEAT LOSS EXCEEDING BODY'S HEAT PRODUCTION RESULTING IN BODY TEMPERATURE OF 95 DEGREES FAHRENHEIT OR LOWER. 6. **FIRST AID MEASURES:** REMOVE WET CLOTHING, REST AFFECTED PART AND REWARM IT PROMPTLY TO ROOM TEMPERATURE, EXCEPT IN THE CASE OF FROSTBITE WHEN THAWING SHOULD ONLY BE ATTEMPTED BY MEDICAL PERSONNEL. TREAT INJURIES AND EVACUATE TO MEDIC OR TROOP MEDICAL CLINIC.	E UNLIKELY	II CRITICAL	LOW
2. EYE/HEARING LOSS	D REMOTE	II CRITICAL	MEDIUM	**RANGE OIC OR SAFETY OFFICER WILL:** 1. BRIEF STUDENTS ON THE DANGERS OF LOW HANGING BRANCHES. 2. ENSURE QUALIFICATION COURSE DETAIL PERSONNEL WEAR SAFETY GOGGLES OR GLASSES WHILE STUDENTS ARE NEGOTIATING THE COURSE. 3. BRIEF SOLDIERS ON THE DANGER OF WATCHING A LIVE GRENADE AFTER THROWING. 4. ENSURE SOLDIERS ARE WEARING HEARING PROTECTION WHEN APPROPRIATE. 5. ENSURE EXTRA EARPLUGS ARE AVAILABLE.	E UNLIKELY	II CRITICAL	LOW

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Figure B-3. Example of risk management worksheet (continued).

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
3. SOLDIER STRUCK BY LIGHTNING	E UNLIKELY	I CATASTROPHIC	MEDIUM	**RANGE OIC OR SAFETY OFFICER WILL:** 1. SUSPEND ALL TRAINING DURING ELECTRICAL STORMS. 2. NOTIFY RANGE CONTROL, BATTALION HEADQUARTERS (HQ) AND COMPANY HQ OF ANY INCIDENT. 3. CONTROL THE STUDENTS. 4. BRIEF STUDENTS ON ELECTRICAL STORM PLAN AND POINT OUT LOCATION TO GROUND GEAR AND AN OPEN AREA TO MOVE TO IN THE EVENT OF LIGHTNING. **INSTRUCTORS WILL:** 1. ENSURE ALL STUDENTS GROUND THEIR INDIVIDUAL EQUIPMENT AND DON THEIR WET-WEATHER GEAR. 2. ENSURE ALL STUDENTS ARE SPREAD 5 TO 10 METERS APART IN AN OPEN AREA, UNTIL THE STORM CLEARS OR THE TRAINING UNIT DEPARTS.	E UNLIKELY	II CRITICAL	LOW
4. SOLDIER BITTEN/STUNG BY SNAKES OR INSECTS	D REMOTE	I CATASTROPHIC	HIGH	**RANGE OIC OR SAFETY OFFICER WILL:** DURING A SAFETY BRIEFING, INFORM THE STUDENTS OF THE VARIOUS TYPES OF WILDLIFE THAT ARE HAZARDOUS AND WARN THEM NOT TO HANDLE OR HARASS THE WILDLIFE DURING TRAINING.	E UNLIKELY	II CRITICAL	LOW
5. FALLS	D REMOTE	II CRITICAL	MEDIUM	**OIC OR SAFETY OFFICER WILL:** 1. GIVE SAFETY BRIEFING ALERTING SOLDIERS TO TRIPPING HAZARDS: ROCKS, BRANCHES, FALLEN TREES, AND CREEK BEDS. 2. BRIEF SOLDIERS PRIOR TO THE HAND GRENADE QUALIFICATION COURSE (HGQC) ON SPECIFIC HAZARDS ASSOCIATED WITH THEIR RESPECTIVE COURSE.	E UNLIKELY	II CRITICAL	LOW
6. DEMONSTRATI0N OF AN M14 INCENDIARY GRENADE COULD BURN RETINA IN EYES	D REMOTE	II CRITICAL	MEDIUM	**RSO WILL:** BRIEF SOLDIERS NOT TO LOOK DIRECTLY AT THE GRENADE DURING DEMONSTRATION. **INSTRUCTORS WILL:** MONITOR SOLDIERS TO ENSURE THEY DO NOT LOOK AT THE GRENADE.	E UNLIKELY	III MARGINAL	LOW

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Figure B-3. Example of risk management worksheet (continued).

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
7. SOLDIER MISSES BUNKER WHILE USING COOK OFF TECHNIQUE--FUSE RESIDUE FROM PRACTICE FUSE COULD HIT SOLDIER.	D REMOTE	III MARGINAL	LOW	**INSTRUCTORS WILL:** 1. MONITOR SOLDIERS TO ENSURE THEY DO NOT LOOK AT THE GRENADE. 2. DEMONSTRATE COOK OFF TECHNIQUES AND TALK SOLDIERS THROUGH THE TECHNIQUES. 3. ENSURE COOK OFF IS ONLY USED WITH PRACTICE FUSES. 4. ENSURE SOLDIERS TURN AND FACE THE REAR OF THE BUNKER TO KEEP FRAGMENTS FROM HITTING THEM IN THE FACE. **RANGE OIC OR SAFETY OFFICER WILL:** 1. BRIEF ALL INSTRUCTORS ON THE SAFETY PROCEDURES TO BE FOLLOWED ON THE HGQC. 2. ENSURE SOLDIERS ON DETAIL ARE WEARING EYE PROTECTION AND BLACK GLOVES WHILE RETRIEVING GRENADES. 3. ENSURE SOLDIERS ON DETAIL ARE NOT RETRIEVING GRENADES UNLESS INFORMED BY THE GRADER AND ARE NOT THROWING GRENADES AT ANY TIME.	D REMOTE	IV NEGLIGIBLE	LOW
8. BURNING HANDS ON EXPENDED PRACTICE GRENADES	D REMOTE	III MARGINAL	LOW	AMMUNITION NCO ENSURES SOLDIERS USE BLACK LEATHER SHELLS WHEN REFUSING PRACTICE FUSE HEADS.	D REMOTE	IV NEGLIGIBLE	LOW
9. AMMUNITION/ PYROTECHNICS	D REMOTE	II CRITICAL	MEDIUM	**RSO WILL:** ENSURE ALL WEAPONS HAVE BLANK ADAPTERS. **AMMUNITION NCO:** WILL KEEP ALL M67 HAND GRENADES IN THE AMMUNITION BUNKER AND UNDER GUARD AT ALL TIMES.	E UNLIKELY	II CRITICAL	LOW

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Figure B-3. Example of risk management worksheet (continued).

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
10. SOLDIER HIT BY THROWN PRACTICE GRENADE	D REMOTE	III MARGINAL	MEDIUM	**RSO WILL:** WARN SOLDIERS TO WATCH FOR OTHER SOLDIERS IN THE PATH OF FLYING PRACTICE GRENADES AND ACTIONS TO TAKE IF IN THE PATH OF A THROWN PRACTICE GRENADE. **INSTRUCTORS WILL:** 1. ALLOW ENOUGH DISTANCE BETWEEN QUALIFYING SOLDIERS TO ENSURE OVERTHROWN PRACTICE GRENADES WILL NOT HIT SOLDIERS. 2. ENSURE SOLDIERS WEAR KEVLAR HELMET AT ALL TIMES WHILE ON, OR IN THE VICINITY OF, THE QUALIFICATION COURSE. 3. ENSURE SOLDIERS NOT INVOLVED IN THE HGQC STAY CLEAR OF THE QUALIFICATION COURSE	E UNLIKELY	III MARGINAL	LOW
11. LOST SOLDIER	D REMOTE	II CRITICAL	MEDIUM	1. SAFETY BRIEFING WILL INCLUDE MEASURES TO TAKE IF LOST OR SEPARATED. 2. A SITUATION REPORT WILL BE PROVIDED TO THE CHAIN OF COMMAND, BN, REGT, AND RANGE CONTROL. 3. A THOROUGH SEARCH WILL BE CONDUCTED FOR THE LOST SOLDIER IN COORDINATION WITH TRAINING COMPANY CADRE AND USING ALL AVAILABLE MANPOWER.	E UNLIKELY	III MARGINAL	LOW
12. ROAD CONDITIONS	D REMOTE	II CRITICAL	MEDIUM	1. RSO GIVES DETAILED SAFETY BRIEFING. 2. 5 M.P.H. SPEED LIMIT SIGNS ARE POSTED IN THE TRAINING AREA. 3. SAFETY BRIEFING INCLUDES CURRENT AND EXPECTED WEATHER CONDITIONS AND THE POSSIBLE EFFECT ON ROAD CONDITIONS.	D REMOTE	III MARGINAL	LOW

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Figure B-3. Example of risk management worksheet (continued).

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
13. MANDATORY TRAINING PRIOR TO LIVE BAY	D REMOTE	III MARGINAL	MEDIUM	1. SOLDIERS ARE TAUGHT PROPER GRIP AND THROWING TECHNIQUE AT "DISTANCE AND ACCURACY" TRAINING AND THE TRAINING IS REINFORCED IN THE MOCK BAY. 2. ALL SOLDIERS MUST SUCCESSFULLY COMPLETE "DISTANCE AND ACCURACY" AND MOCK BAY TRAINING PRIOR TO ENTERING THE LIVE BAY. 3. AT THE MOCK BAY SOLDIERS RECEIVE DEMONSTRATIONS AND REHEARSE THE EVACUATION DRILL AS STATED UNDER "RANGE SPECIFIC HAZARDS" 4. ALL INSTRUCTORS WILL REHEARSE AND ALL UNASSIGNED INSTRUCTORS WILL BE RECERTIFIED ON THE PIT EVACUATION DRILLS THE MORNING PRIOR TO CONDUCTING A LIVE BAY EXERCISE. PRIMARY INSTRUCTOR (PI) WILL CONTROL INSTRUCTOR ROTATION ENSURING A 10 MINUTE BREAK EVERY 30 MINUTES. 5. THE PIT NCO WILL BE A SSG CERTIFIED BY THE RANGE OIC AND A/2-29 COMPANY COMMANDER. 6. TRAINING COMPANY COMMANDER OR FIRST SERGEANT WILL BE ON SITE DURING LIVE GRENADE THROW IAW TRAINING BRIGADE POLICY.	E UNLIKELY	II CRITICAL	LOW
14. RANGE SPECIFIC HAZARDS				PIT NCO WILL DIRECT AND CONTROL THE SOLDIER HE HAS IN THE PIT WITH HIM AND MAINTAIN POSITIVE VISUAL OBSERVATION AND CONTROL OF THE LIVE GRENADES THE ENTIRE TIME THE SOLDIER IS IN THE PIT.			
14(A). ARMED HAND GRENADE DROPPED IN LIVE BAY	D REMOTE	I CATASTROPHIC	HIGH	PIT NCO AND SOLDIER EXECUTE THE EVACUATION DRILL AS REHEARSED IN THE MOCK BAY, EXITING THE PIT OVER THE BACK WALL. PIT NCO WILL ENSURE, PHYSICALLY IF NECESSARY, THE SOLDIER GETS OVER THE BACK WALL.	E UNLIKELY	I CATASTROPHIC	MEDIUM
14(B). ARMED HAND GRENADE DROPPED OFF BACK WALL	C OCCASIONAL	II CRITICAL	HIGH	PIT NCO AND SOLDIER EXECUTE SAFETY DRILL AS REHEARSED IN THE MOCK BAY. PIT NCO AND SOLDIER WILL ASSUME THE PRONE POSITION PARALLEL TO THE BACK WALL. PIT NCO WILL ENSURE THE SOLDIER'S HEAD IS BELOW THE TOP OF THE BACK WALL.	D REMOTE	II CRITICAL	MEDIUM
14(C). SOLDIER WATCHES GRENADE AFTER THROW	C OCCASIONAL	II CRITICAL	HIGH	PIT NCO WILL PHYSICALLY PULL THE SOLDIER DOWN BEHIND THE FRONT WALL OF THE LIVE BAY.	D REMOTE	II CRITICAL	MEDIUM

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Figure B-3. Example of risk management worksheet (continued).

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HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
14(D). SOLDIER FREEZES AFTER ARMING GRENADE	D REMOTE	II CRITICAL	MEDIUM	PIT NCO WILL REINFORCE THE COMMAND "THROW GRENADE." PIT NCO WILL GRASP SOLDIER'S HAND AND APPLY PRESSURE TO THE SAFETY LEVER. PIT NCO WILL WALK SOLDIER FORWARD AND EXTEND HIS HANDS OVER THE FRONT WALL. PIT NCO ENSURES SOLDIER'S HEAD IS BELOW THE FRONT WALL, THEN LETS THE SOLDIER DROP THE GRENADE IN FRONT OF THE LIVE BAY.	E UNLIKELY	II CRITICAL	LOW
14(E). SOLDIER COOKS OFF GRENADE	C OCCASIONAL	I CATASTROPHIC	HIGH	PIT NCO CONTINUES TO REINFORCE THE COMMAND TO "THROW GRENADE." PIT NCO WILL NOT ATTEMPT TO GRAB THE GRENADE DUE TO THE RISK THAT SOLDIER MAY DROP IT IN THE LIVE BAY.	D REMOTE	I CATASTROPHIC	HIGH
14(F). SOLDIER MILKS GRENADE PRIOR TO THROWING	C OCCASIONAL	I CATASTROPHIC	HIGH	IF PIT NCO HEARS METALLIC CLICK (GRENADE ARMED), HE WILL REINFORCE THE COMMAND "THROW GRENADE." IF PIT NCO DOES NOT HEAR A METALLIC CLICK (GRENADE NOT ARMED), HE WILL GRAB THE SOLDIER'S HAND AND APPLY PRESSURE TO THE SAFETY LEVER. PIT NCO WILL WALK THE SOLDIER TO THE FRONT WALL, ENSURE SOLDIER'S HEAD IS BELOW THE FRONT WALL, AND LET THE SOLDIER DROP THE GRENADE IN FRONT OF THE LIVE BAY.	D REMOTE	I CATASTROPHIC	HIGH
14(G). SOLDIERS BEING HIT BY FRAGMENTS FROM THE M67 FRAGMENTATION GRENADE	D REMOTE	II CRITICAL	MEDIUM	1. RSO ENSURES ALL SOLDIERS ARE WEARING KEVLAR VESTS WHILE FORWARD OF THE SAFETY BARRIER AND WHILE THROWING THE LIVE M67 FRAGMENTATION GRENADE. 2. OIC ENSURES MEDIC WITH AID BAG IS IN THE TOWER DURING LIVE GRENADE TRAINING, AND THE AMBULANCE IS NEXT TO RANGE SHACK. 3. PI/DRILL SERGEANTS (DSs) ENSURE KEVLAR HELMET IS WORN AT ALL TIMES. 4. SOLDIERS WILL BE UNDER OVERHEAD COVER AT ALL TIMES EXCEPT WHEN THEY THEMSELVES ARE THROWING THEIR HAND GRENADES. 5. DSs/INSTRUCTORS WILL CONTROL SOLDIERS UNDER OVERHEAD COVER.	E UNLIKELY	II CRITICAL	LOW

FB Form 46-R, 20 Apr 95

Figure B-3. Example of risk management worksheet (continued).

RISK MANAGEMENT WORKSHEET
CONTINUATION

Operation/Training Event: MALONE 1 (HAND GRENADES) **Page 9 of 9**
Organization: A CO, 2/29th IN REGT **Date: RECURRING EVENT** **Prepared by: SFC ROGERS**

HAZARD	INITIAL PROBABILITY	INITIAL EFFECT	INITIAL RISK LEVEL	CONTROLS IMPLEMENTED	RESIDUAL PROBABILITY	RESIDUAL EFFECT	RESIDUAL RISK LEVEL
14(H). HEARING LOSS FROM EXPLOSION	B LIKELY	III MARGINAL	MEDIUM	1. DSs ENSURE SOLDIERS ARE WEARING HEARING PROTECTION AT ALL TIMES WHILE AT LIVE BAY. 2. PI ENSURES EXTRA EAR PLUGS ARE AVAILABLE.	D REMOTE	F NEGLIGIBLE	LOW
14(I). PREMATURE DETONATION AT GRENADE ISSUE POINT	D REMOTE	I CATASTROPHIC	HIGH	1. AMMUNITION NCO MAINTAINS NO MORE THAN TWO CASES (60 GRENADES) AT THE ISSUE POINT AT ANY ONE TIME. 2. AMMUNITION NCO ISSUES M67 FRAGMENTATION GRENADES DIRECTLY FROM CANISTER TO THE SOLDIER	E UNLIKELY	I CATASTROPHIC	MEDIUM

FB Form 46-R, 20 Apr 95

Figure B-3. Example of risk management worksheet (continued).

APPENDIX C

RANGE CONSTRUCTION/MODIFICATION

This appendix provides structural dimensions and safety requirements for the construction and modification of a hand grenade range.

C-1. STRUCTURAL DIMENSIONS

The structural dimensions of live-bay throwing pits are accomplished IAW Chapter 4 with a separation distance of 25 meters between each lane. This places adjacent pits outside the effective casualty-producing radius of 15 meters for the M67 fragmentation grenade. A rear wall (knee wall) is constructed no more than 0.6 meter (2 feet) high and 0.15 meter (6 inches) thick. It extends the width of the throwing pit, connecting both ends of the enclosure. Slope the top of the knee wall inward to allow any grenade dropped on the wall to roll into the throwing pit. Install drain pipes (no more than 2 inches in diameter) in the knee wall to allow throwing pit drainage. Slope the floor of the pits in the direction of the drainage pipes. Do not construct grenade sumps or ditches inside the throwing pits (Figure C-1).

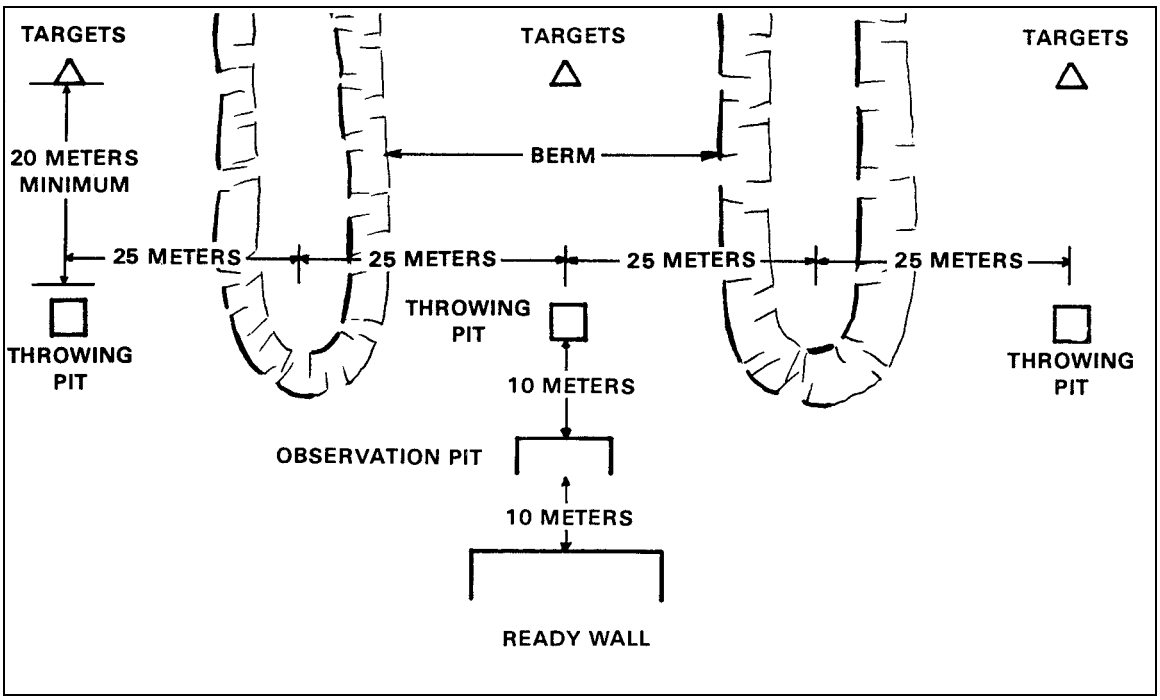

Figure C-1. Range layout.

C-2. SAND/SAWDUST PIT AND THROWING PIT

A sand/sawdust pit is placed outside the knee wall to cushion the fall of personnel diving over the wall in the event a grenade is dropped in the throwing pit (Figure C-2).

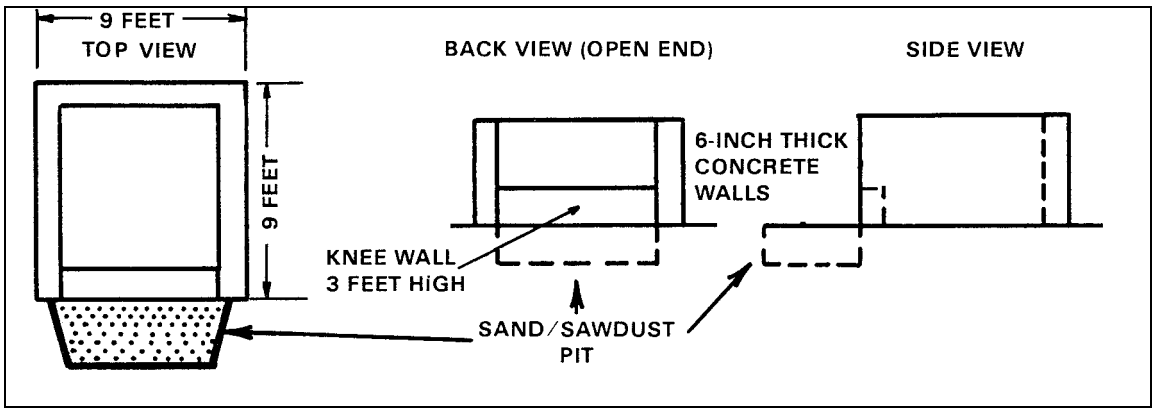

Figure C-2. Sand/sawdust pit and throwing pit.

C-3. PIT SEPARATIONS

Where possible, separate the throwing pits by using steel, concrete, or wooden revetments or earthen berms of a length and height to lessen the effect of high velocity, low angle fragments (for example, 50 meters long and 1.8 meters high). The thickness varies according to the type of construction used. This permits grenade throwing to continue from the adjacent pit when a dud grenade requires closure of a specific pit pending dud disposal.

C-4. OBSERVATION PITS

Observation pits are built of a sufficient height to enable the OIC to observe and control all throwing pits. Laminated windowpanes, constructed as described below, provide the necessary degree of safety for the observation pits.

- 10-mm glass (outside).
- 7-mm polycarbonate resin sheet.
- 6-mm glass.
- 6-mm polycarbonate resin sheet.
- 6-mm glass.

Total: 35 mm (about 1 3/8 inches).

APPENDIX D

THREAT HAND GRENADES

This appendix provides general information on common threat hand grenade identification, functions, and capabilities. North Korea, China, and many former Soviet Union nations have an extensive inventory of hand grenades. As with most equipment in use by these nations, older hand grenades remain in circulation and use long after being classified obsolete.

Section I. FORMER SOVIET UNION NATIONS

D-1. RGN OFFENSIVE HAND GRENADE

- Type: Offensive. (Figure D-1)
- Weight: 310 grams.
- Body Material: Aluminum.
- Filler Material: 114 grams A-1X-1 (RDX 96 percent, wax 4 percent) explosive.
- Fuze Type: Striker release, impact, or self-destruct.
- Fuze Delay: Impact, 1 to 2 seconds; time, 3.5 to 4 seconds (self-destruct).
- Range Thrown: 30 meters.
- Lethal Radius: 4 meters.

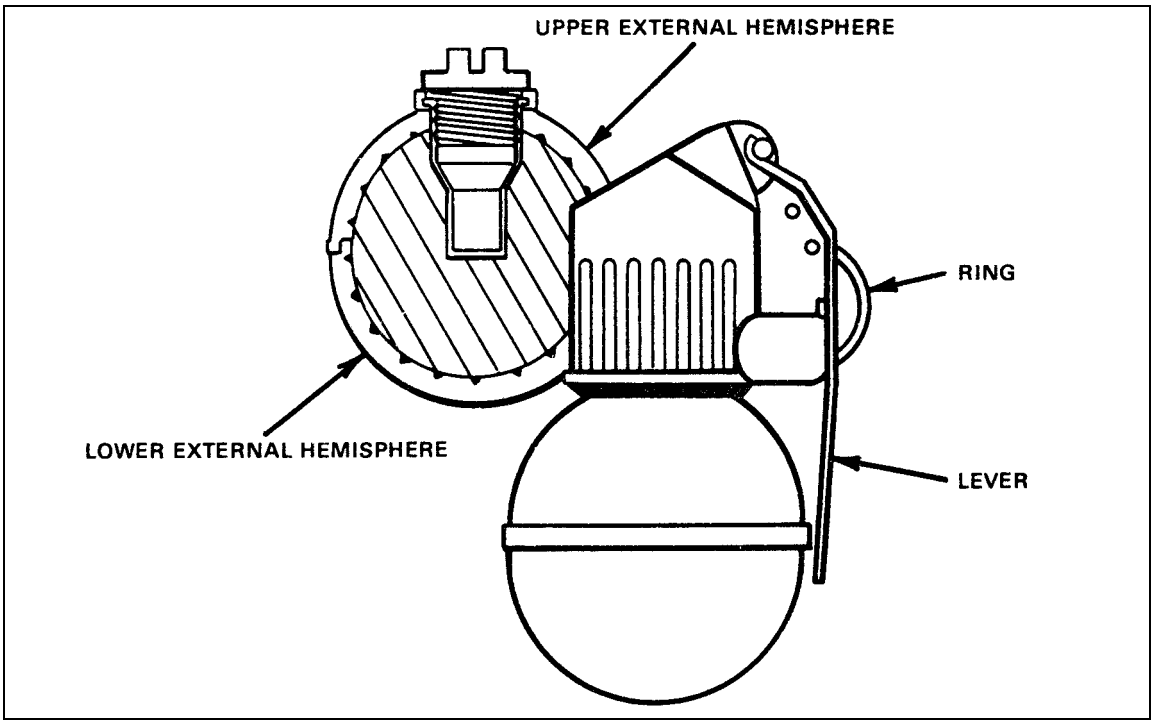

Figure D-1. RGN hand grenade.

D-2. RGO DEFENSIVE HAND GRENADE

- Type: Defensive. (Figure D-2)
- Weight: 530 grams.
- Body Material: Aluminum.
- Filler Material: 92 grams A-1X-1 (RDX 96 percent, wax 4 percent) explosive.
- Fuze Type: Striker release, impact, or self-destruct.
- Fuze Delay: Impact, 1 to 2 seconds; time, 3.5 to 4 seconds.
- Range Thrown: 30 to 40 meters.
- Lethal Radius: 6 meters.

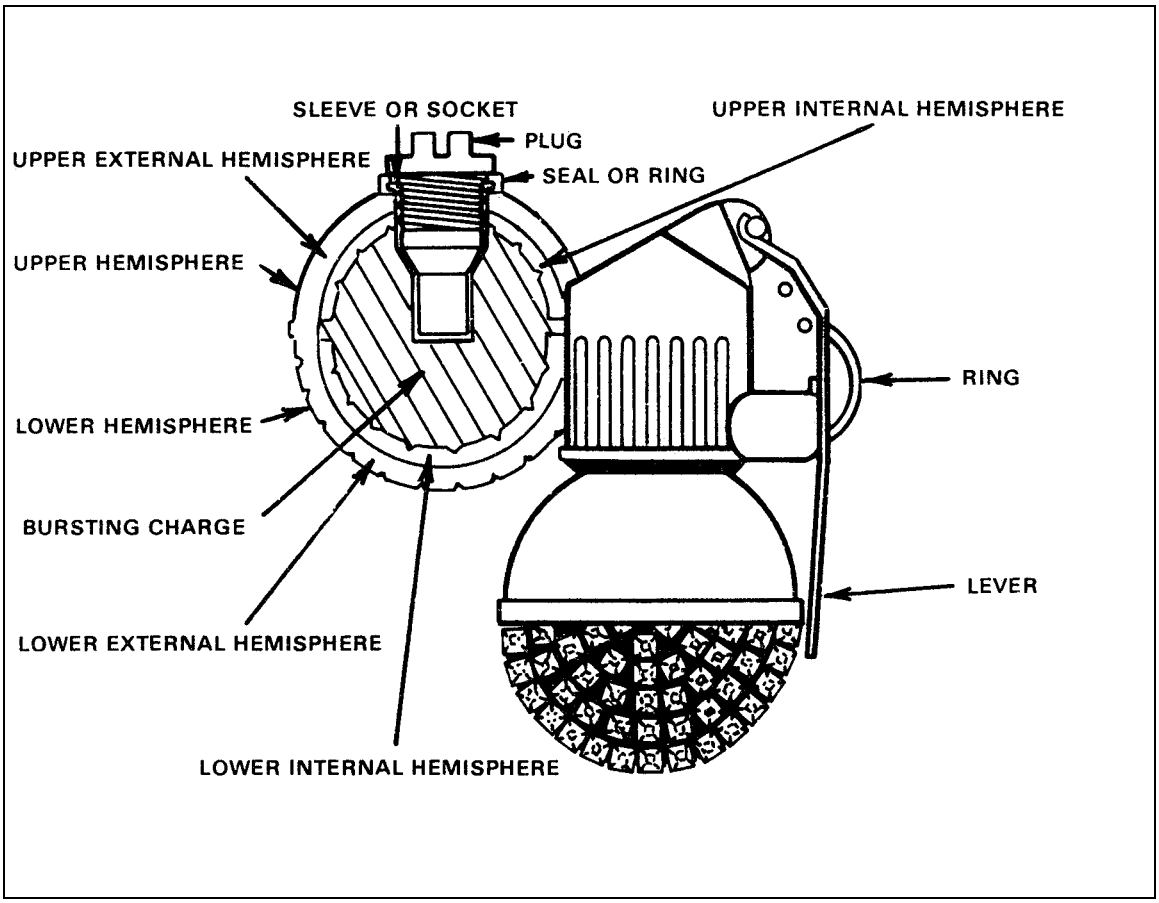

Figure D-2. RGO hand grenade.

D-3. F1 FRAGMENTATION HAND GRENADE

- Type: Fragmentation. (Figure D-3)
- Weight: 700 grams.
- Body Material: Cast iron.
- Filler Material: 60 grams TNT.
- Fuze Type: Striker release.
- Fuze Delay: 3 to 4 seconds; for booby traps, 0 to 13 seconds.
- Range Thrown: 30 meters.
- Lethal Radius: 20 to 30 meters.

NOTE: The F1 has been copied and produced by numerous other countries throughout the world.

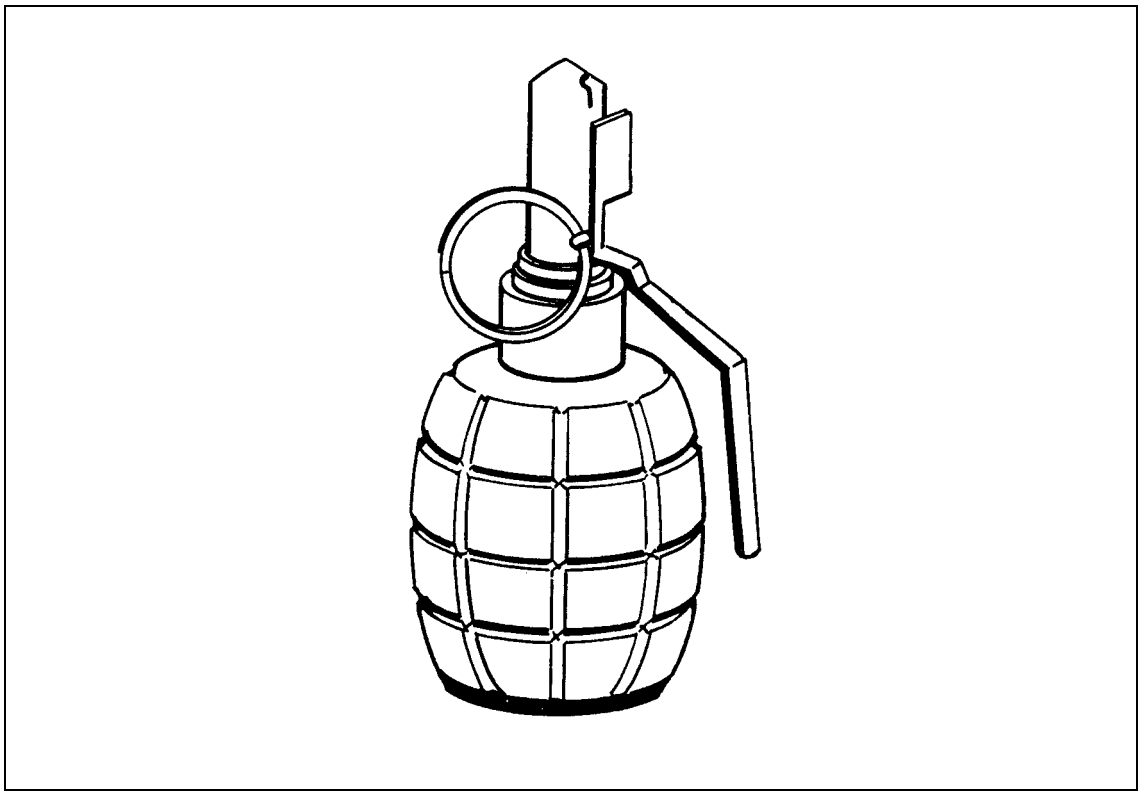

Figure D-3. F1 hand grenade.

D-4. RKG-3M ANTITANK HAND GRENADE

- Type: Antitank. (Figure D-4)
- Weight: With fuze, 1.07 kilograms.
- Weight of HE Filling: TNT/RDX, 540 grams.
- Penetration: 125 millimeters.
- Fuze Type: Instantaneous impact, base detonating.
- Effective Fragment Radius: 20 meters.
- Length: 350 millimeters.
- Diameter: 65 millimeters.

NOTE: The RKG-3 family of grenades has been copied and produced by numerous other countries throughout the world.

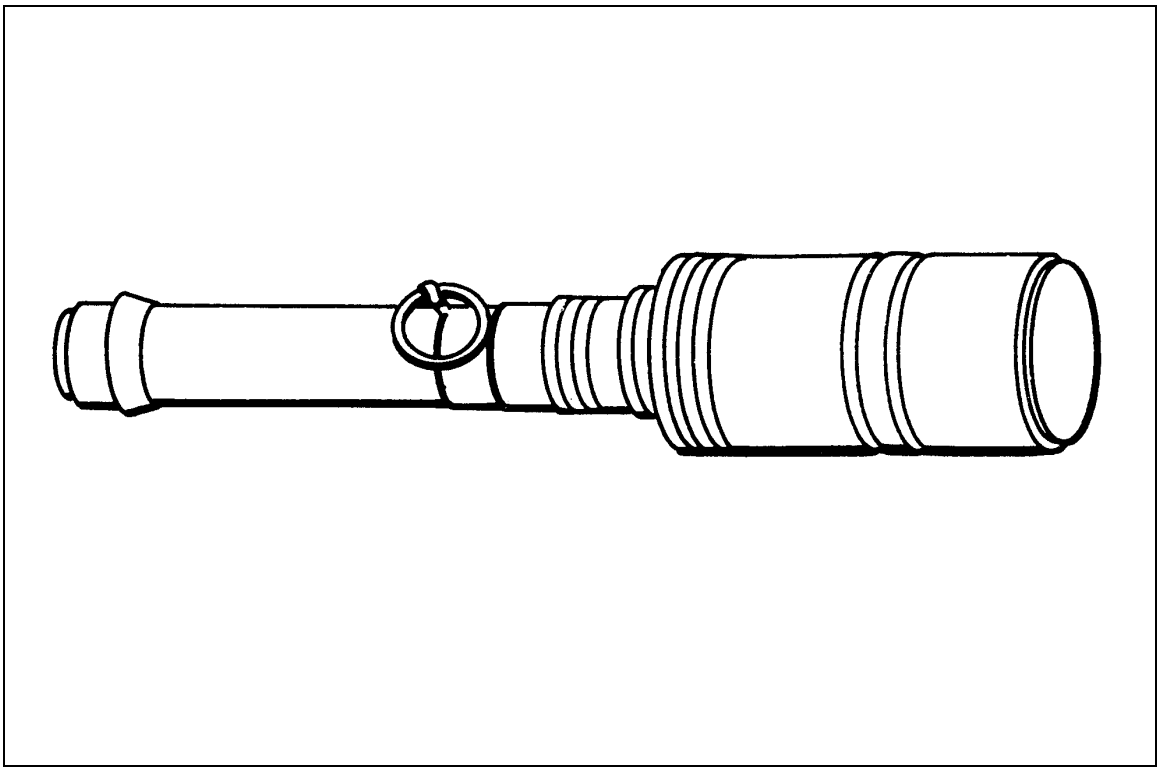

Figure D-4. RKG-3M antitank hand grenade.

D-5. RGD-5 FRAGMENTATION HAND GRENADE

- Type: Fragmentation. (Figure D-5)
- Weight: 310 grams.
- Filler Material: 110 grams of TNT.
- Fuze Delay: 3 to 4 seconds.
- Range Thrown: 40 meters.
- Effective Fragment Radius: 15 to 20 meters, maximum fragment range about 30 meters.

NOTE: The RGD-5 has been copied and produced by numerous other countries throughout the world.

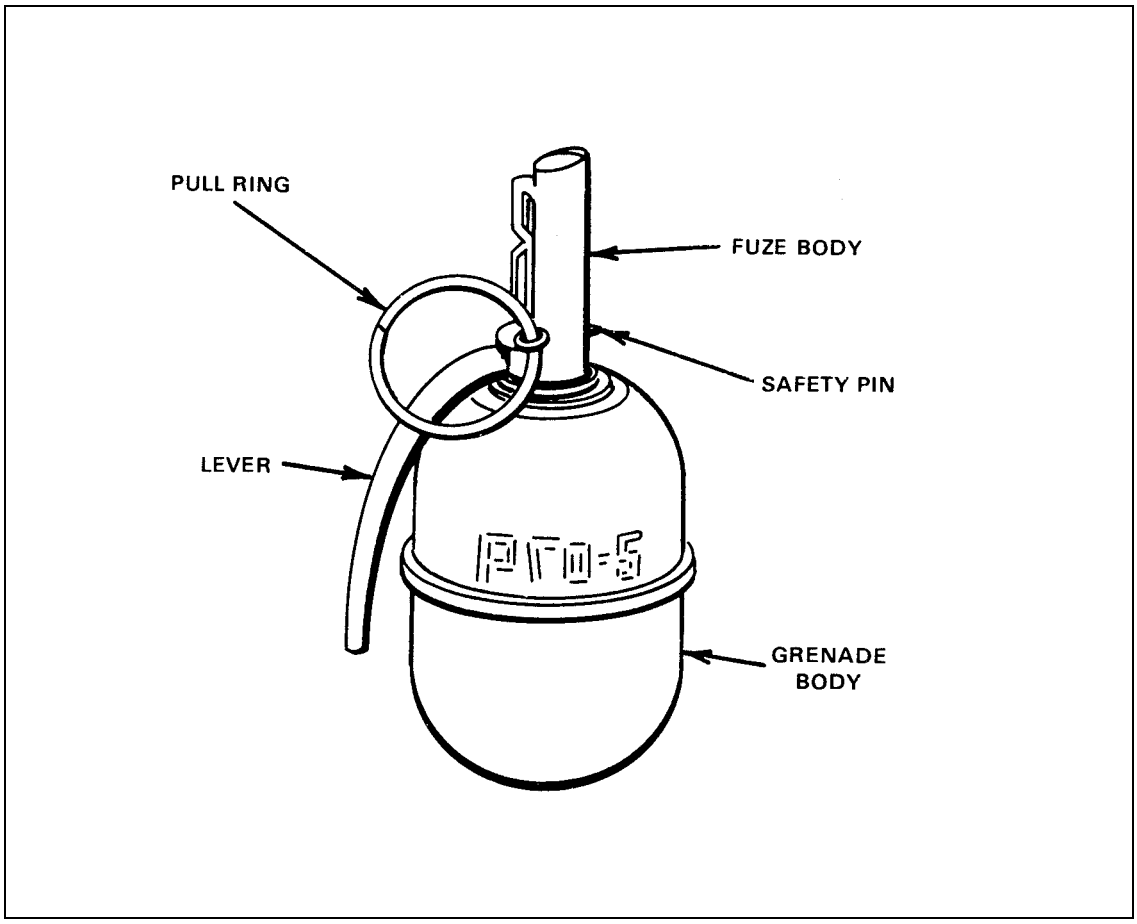

Figure D-5. RGD-5 hand grenade.

D-6. RG-42 FRAGMENTATION HAND GRENADE

- Type: Fragmentation. (Figure D-6)
- Weight: 435 grams.
- Body Material: Steel.
- Filler Material: 110 to 120 grams TNT.
- Fuze Type: Striker release.
- Fuze Delay: 3.2 to 4.2 seconds.
- Range Thrown: 30 meters.
- Effective Fragment Radius: 20 meters.

NOTE: The RG-42 has been copied and produced by numerous other countries throughout the world.

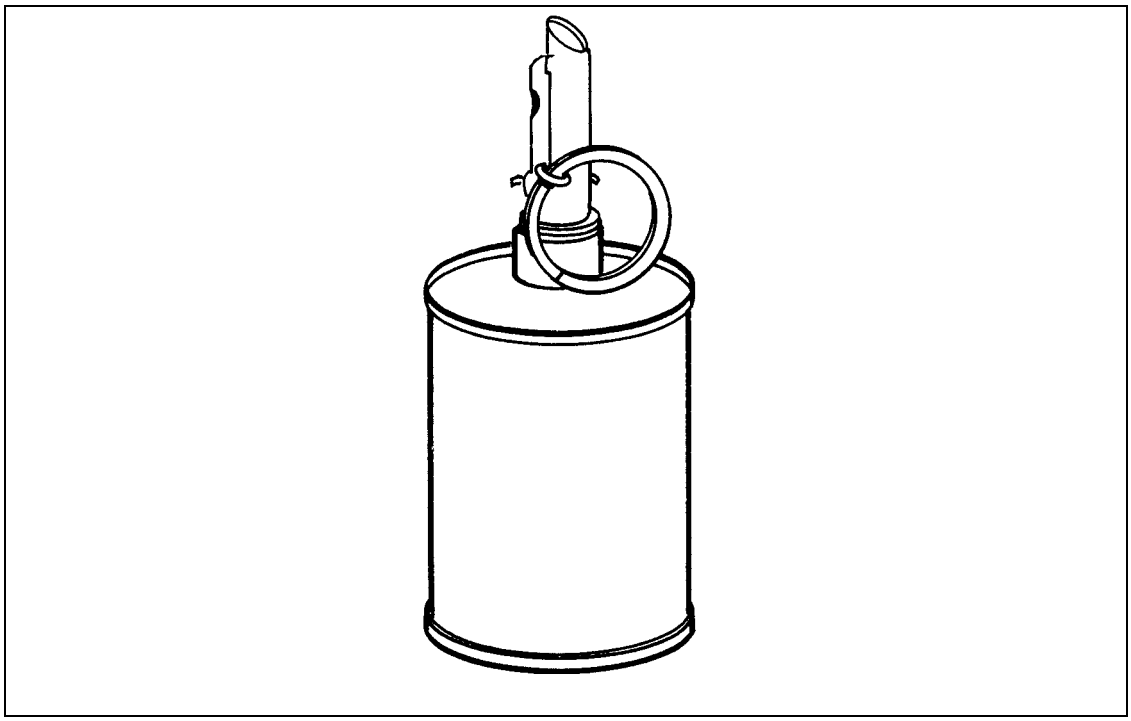

Figure D-6. RG-42 hand grenade.

D-7. RDG-1

- Type: Hand, smoke. (Figure D-7)
- Weight: 500 grams.
- Body Material: Cardboard, handle wood/cardboard.
- Burning Time: 60 to 90 seconds.
- Fuze: Friction fuze.
- Fuze Delay: Unknown.
- Filler: Smoke mixture.
- Range Thrown: 35 meters.

NOTE: This grenade is used to screen river crossings because it floats.

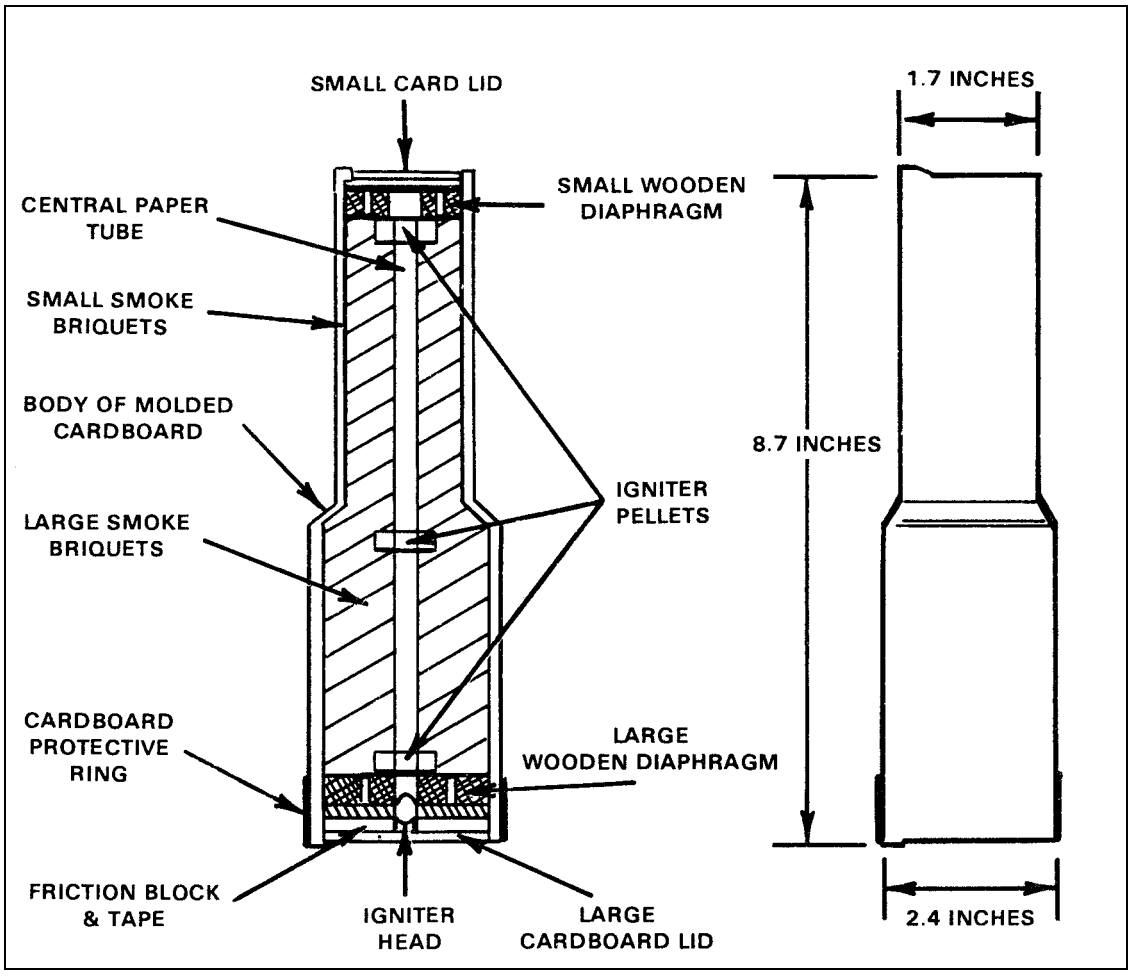

Figure D-7. RDG-1 smoke grenade.

D-8. RDG-2 AND RDG-3

- Type: Smoke. (Figure D-8)
- Weight: 500 grams.
- Body Material: Cardboard coated with wax, handle wood/cardboard.
- Burning Time: 50 to 90 seconds.
- Fuze: Friction fuze.
- Fuze Delay: Unknown.
- Filler: Smoke mixture.
- Range Thrown: 35 meters.

NOTE: This grenade does not float and is unsuitable for water use.

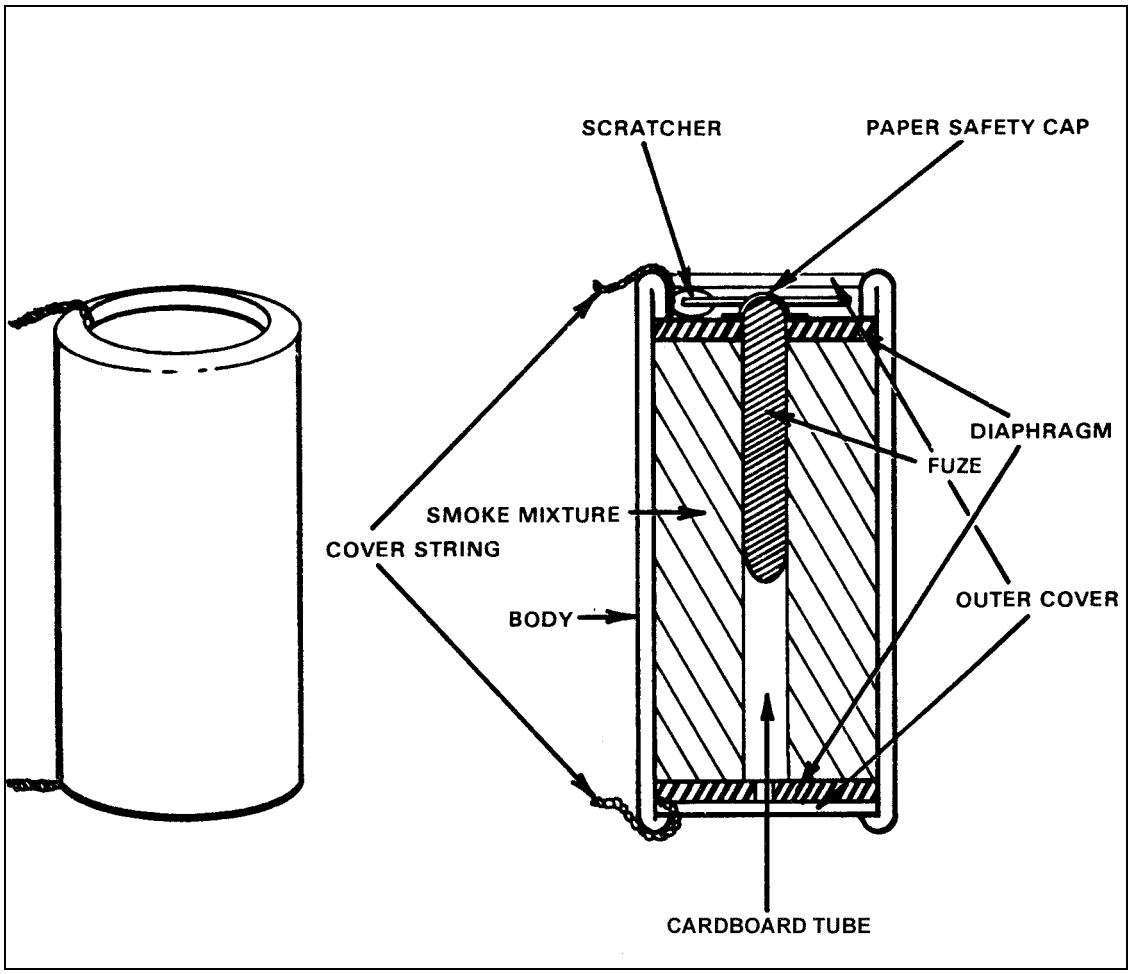

Figure D-8. RDG-2 and RDG-3 smoke grenade.

Section II. NORTH KOREA

D-9. ROUND FRAGMENTATION GRENADE

- Type: Fragmentation. (Figure D-9)
- Weight: 600 grams.
- Body Material: Cast aluminum body with 140 to 150 cast iron balls embedded in it.
- Fuze: Striker release.
- Fuze Delay: 3.2 to 4.2 seconds.
- Filler: TNT, 60 grams.
- Effective Casualty Radius: 20 meters.

NOTE: A variation of this grenade has a plastic body.

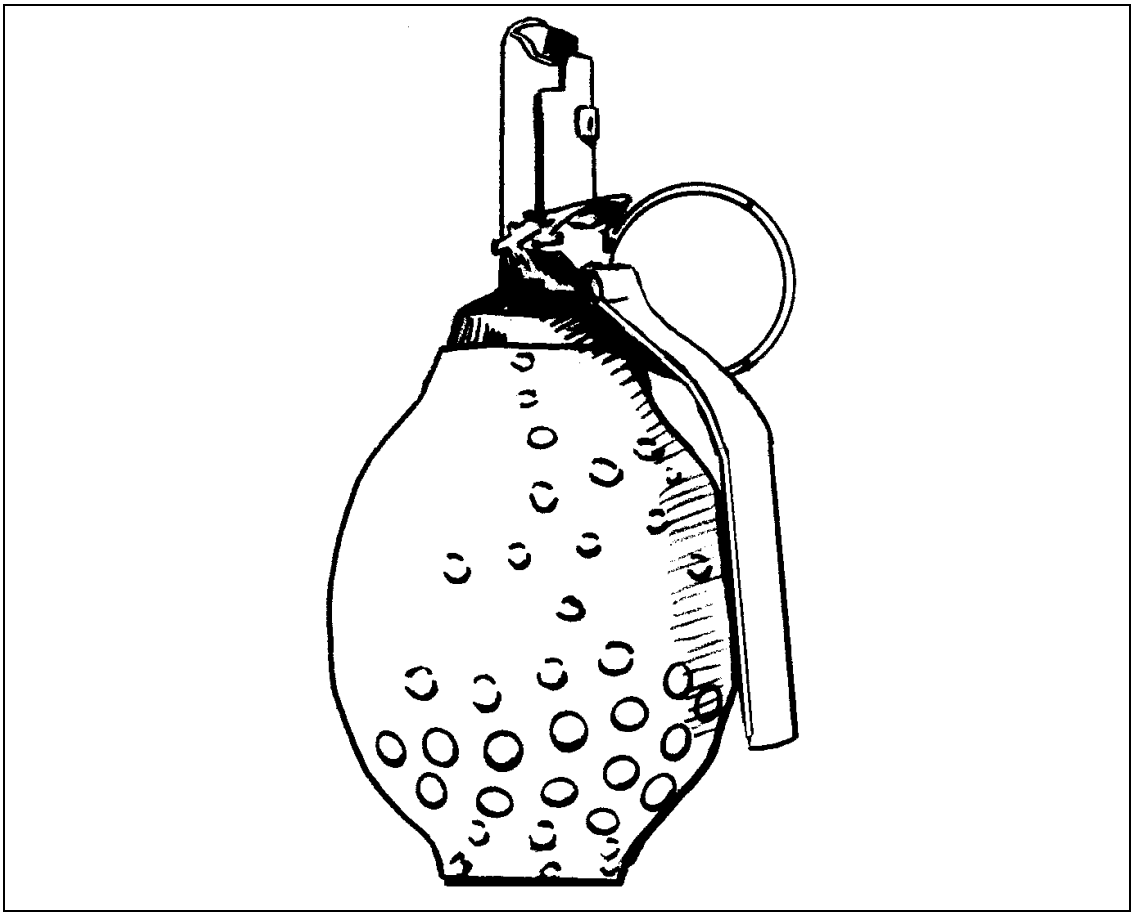

Figure D-9. North Korean fragmentation grenade (round).

D-10. RECTANGULAR FRAGMENTATION GRENADE

- Type: Fragmentation. (Figure D-10)
- Weight: 370 grams.
- Body Material: Sheet steel with about 1,300 steel balls in a cavity between the outer wall and the explosive filler.
- Fuze: Striker release.
- Fuze Delay: 3.2 to 4.2 seconds.
- Filler: Composition B, 55 grams.
- Effective Casualty Radius: 20 meters.

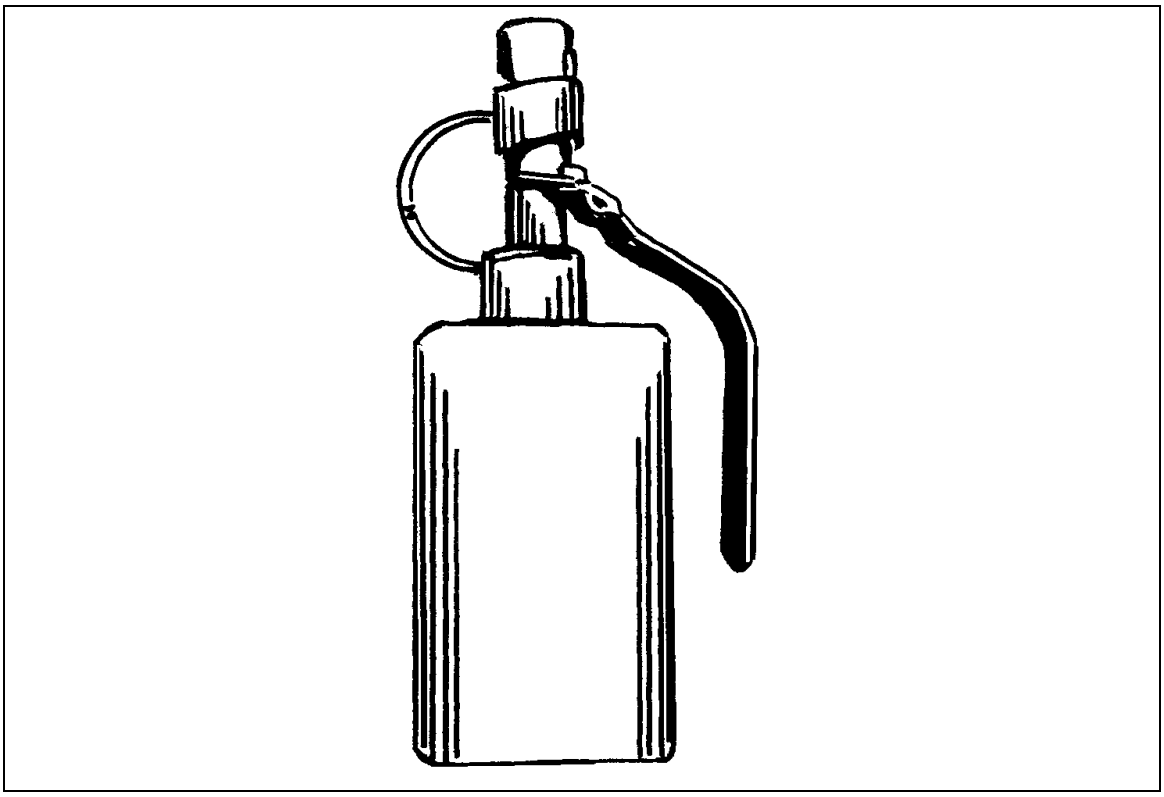

Figure D-10. North Korean fragmentation grenade (rectangular).

D-11. LACHRYMATORY GRENADE

- Type: Lachrymatory. (Figure D-11)
- Weight: 350 grams.
- Body Material: Sheet steel with a wooden handle.
- Fuze: Pull friction.
- Fuze Delay: 3 to 4 seconds.
- Filler: CS mixture/TNT.
- Range Thrown: 20 meters.
- Effective Radius: 10 meters.

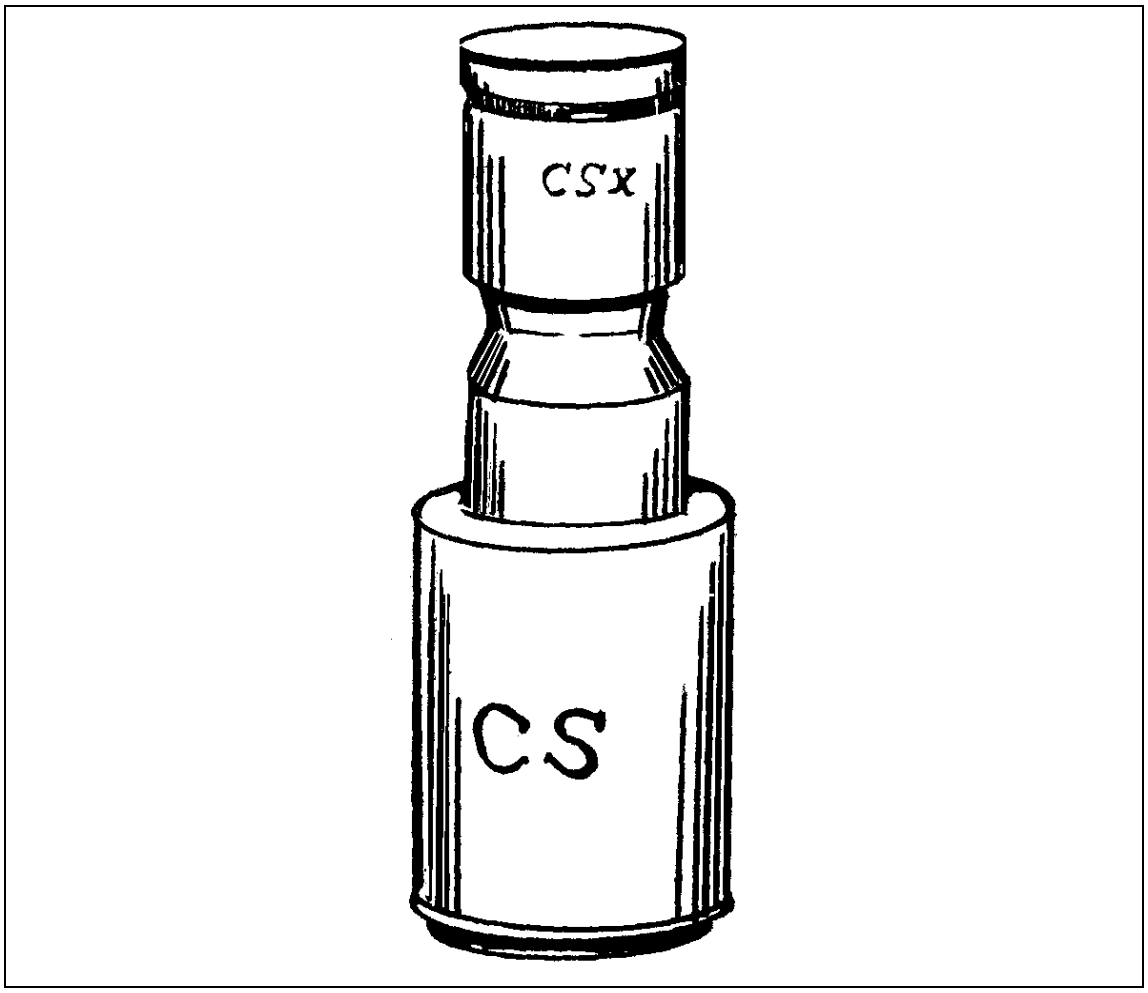

Figure D-11. North Korean lachrymatory grenade.

Section III. CHINA

D-12. TYPE 1 FRAGMENTATION GRENADE

- Type: Fragmentation. (Figure D-12)
- Weight: 600 grams.
- Body Material: Cast iron.
- Fuze: Striker release.
- Fuze Delay: 3 to 4 seconds.
- Filler: TNT, 50 grams.
- Lethal Range: 20 meters.

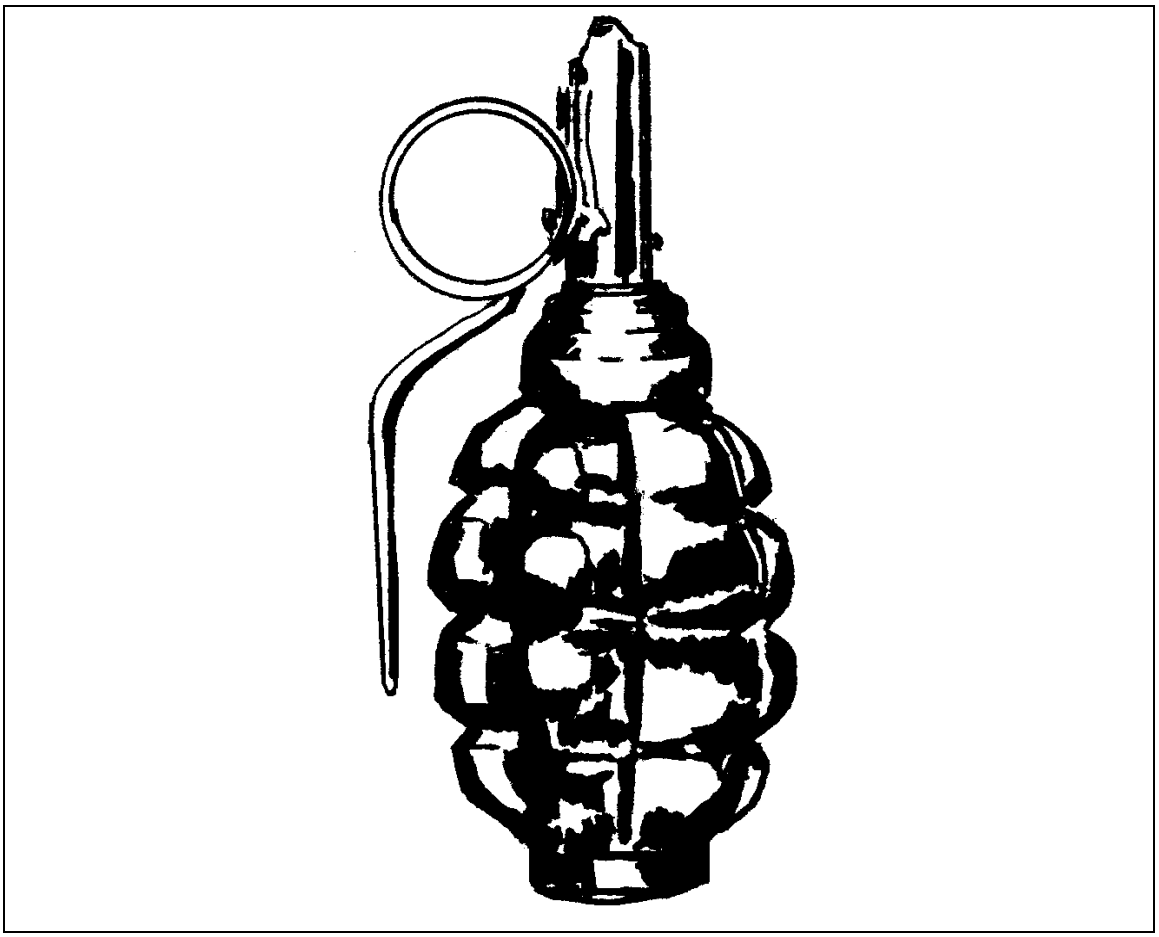

Figure D-12. Type 1 fragmentation grenade.

D-13. TYPE 73 FRAGMENTATION GRENADE

- Type: Fragmentation. (Figure D-13)
- Weight: 190 grams.
- Body Material: Two-piece sheet metal body enclosing a layer of 580 steel balls.
- Fuze: Percussion.
- Fuze Delay: 0.5 to 1 second.
- Filler: Unknown.
- Effective Casualty Radius: 7 meters.

NOTE: A variation of this grenade may be in use as a rifle grenade with a tail fin assembly.

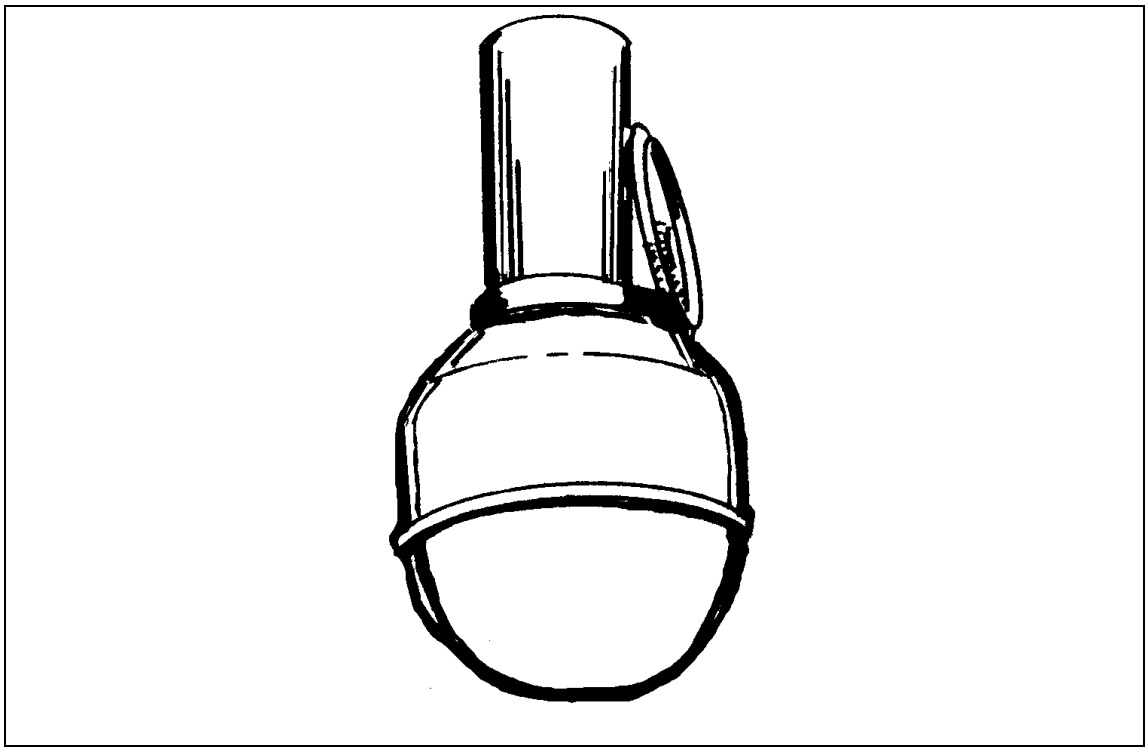

Figure D-13. Type 73 fragmentation grenade.

D-14. TYPE 77-1 FRAGMENTATION STICK

- Type: Fragmentation. (Figure D-14)
- Weight: 380 grams.
- Body Material: Cast iron with a plastic handle and sheet metal or plastic fuze cover cap.
- Fuze: Pull friction.
- Fuze Delay: 2.8 to 4 seconds.
- Filler: TNT, 70 grams.
- Lethal Radius: 7 meters.

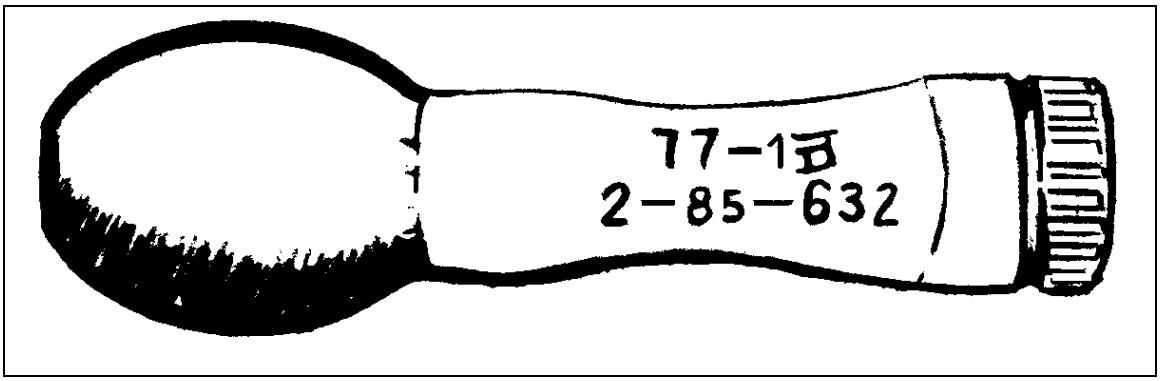

Figure D-14. Type 77-1 fragmentation stick.

D-15. SC-2 LACHRYMATORY GRENADE

- Type: Lachrymatory (explosively dispersed). (Figure D-15)
- Weight: 110 grams.
- Body Material: Plastic.
- Fuze: Striker release or friction.
- Fuze Delay: 2.8 to 3.6 seconds.
- Filler: Tear agent, 25 grams.
- Coverage: 300 cubic meters.

Figure D-15. SC-2 lachrymatory grenade.

D-16. SC-2 LACHRYMATORY/SMOKE GRENADE

- Type: Lachrymatory/smoke. (Figure D-16)
- Weight: 110 grams.
- Body Material: Plastic.
- Fuze: Striker release or friction.
- Fuze Delay: 1.8 to 2.8 seconds.
- Filler: Tear agent/smoke mixture, 70 grams.
- Coverage: 300 cubic meters.

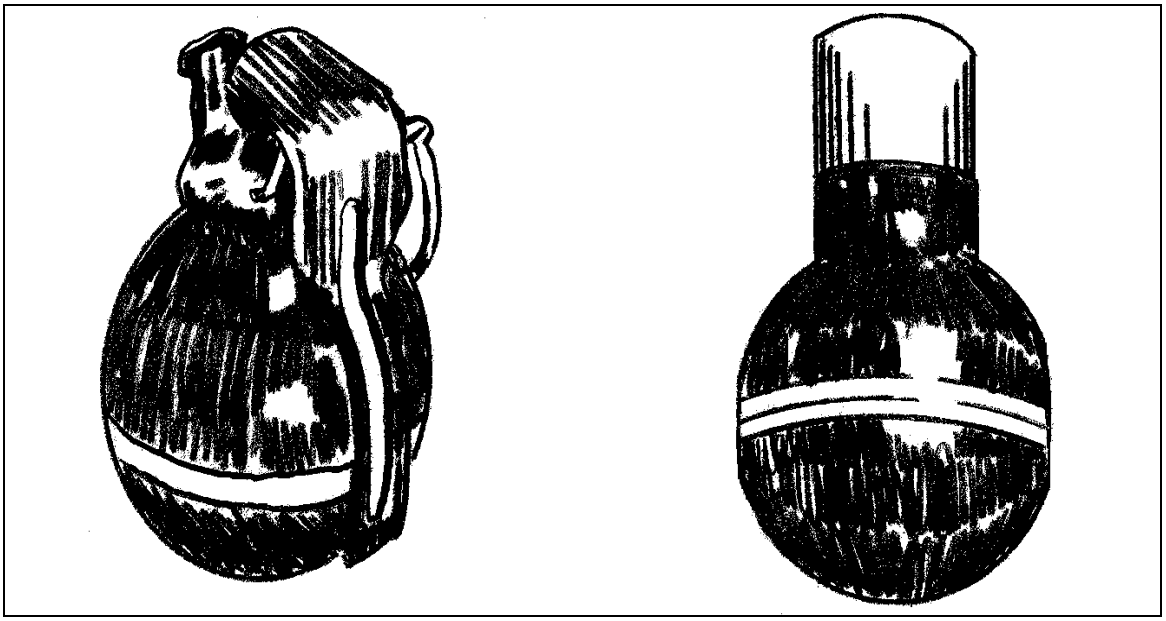

Figure D-16. SC-2 lachrymatory/smoke grenade.

D-17. JYD-1

- Type: Rubber ball. (Figure D-17)
- Weight: 150 grams.
- Body Material: Plastic.
- Fuze: Striker release or friction.
- Fuze Delay: 2.8 to 3.4 seconds.
- Filler: 840 rubber balls; bursting charge, 4 grams.
- Effective radius: 0.3 to 3 meters.

Figure D-17. JYD-1 rubber ball grenade.

D-18. JYB-1

- Type: Stun. (Figure D-18)
- Weight: 150 grams.
- Body Material: Plastic.
- Fuze: Striker release or friction.
- Fuze Delay: 3 to 4 seconds.
- Filler: Pyrotechnic mixture, 45 grams.
- Coverage: Sound level over 150 decibels within 10 meters.

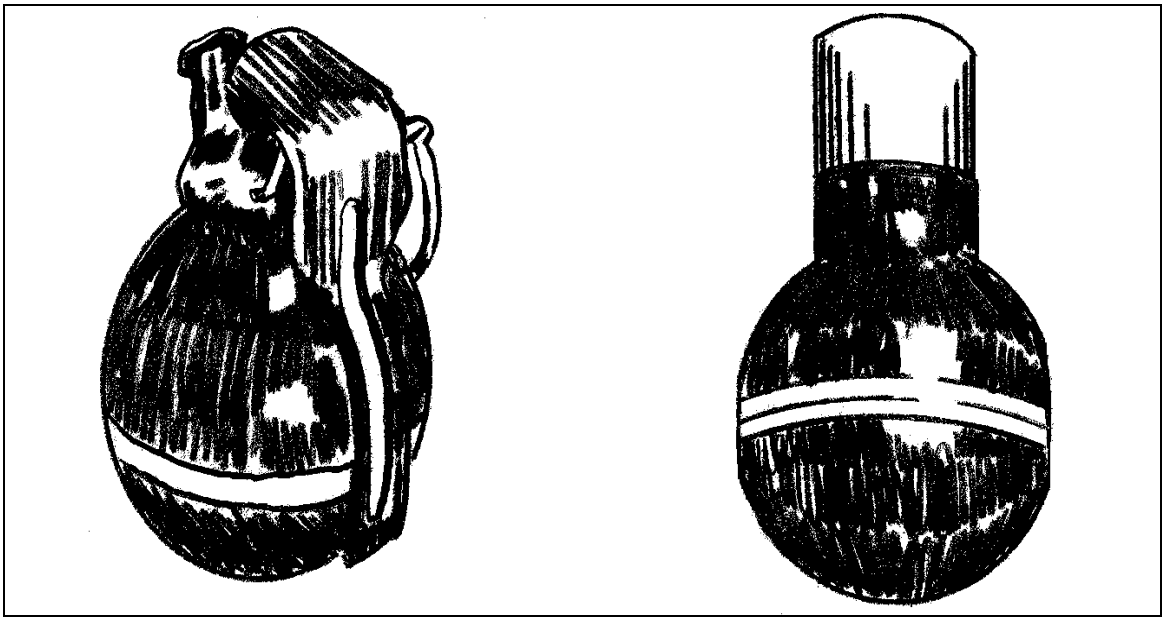

Figure D-18. JYB-1 stun grenade.

D-19. JYS-1

- Type: Flash/bang. (Figure D-19)
- Weight: 45 grams.
- Body Material: Plastic.
- Fuze: Striker release or friction.
- Fuze Delay: Unknown.
- Filler: Pyrotechnic mixture, 25 grams.
- Effective Range: 10 meters.
- Flash Intensity: 40,000,000 candella.

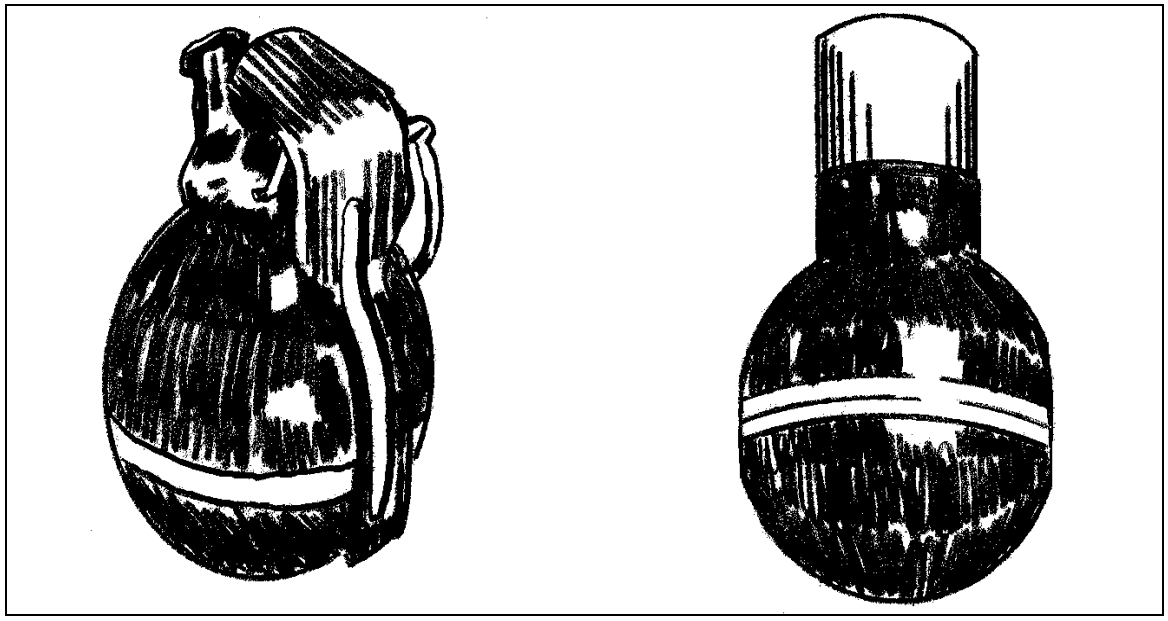

Figure D-19. JYS-1 flash/bang grenade.

APPENDIX E

OBSOLETE HAND GRENADES

This appendix provides data for identifying and understanding the description and capabilities of obsolete US hand grenades. Although these grenades are no longer common to the US inventory, the majority of them are still in use by other services or nations.

E-1. M30 PRACTICE HAND GRENADE

The M30 practice grenade (Figure E-1) simulates the M26 series of fragmentation hand grenades for training purposes. The M30 adds realism to training and familiarizes the soldier with the functioning and description of the fragmentation hand grenade.

a. **Body**. The grenade body is cast iron and is reusable.

b. **Fuze**. The fuze is an M205A1 or M205A2.

c. **Weight**. The grenade weighs 16 ounces.

d. **Safety Clip**. See paragraph 1-3.

e. **Capabilities**. The average soldier can throw the grenade 40 meters. The M30 emits a small puff of white smoke after a delay of 4 to 5 seconds and makes a loud popping sound.

f. **Color and Markings**. The grenade is light blue with white markings.

WARNING

Fuze fragments can exit the hole in the base of the grenade body and cause injury.

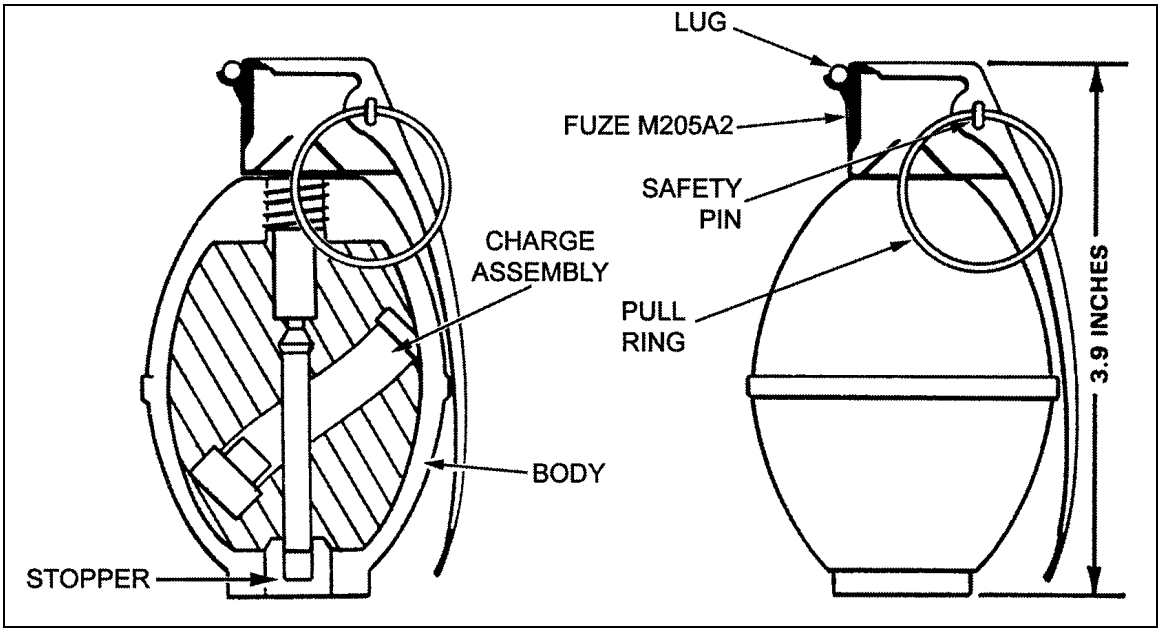

Figure E-1. M30 practice grenade.

E-2. MK1 ILLUMINATION HAND GRENADE

The MK1 illumination hand grenade (Figure E-2) is a ground signaling and ground pyrotechnic signal, except that the grenade burns only at ground level whereas pyrotechnic signals burn in flight or while suspended from a parachute. The MK1 should not be used in deep mud or swampy ground, which would result in little or no illumination. The grenade burns with a very hot flame and may be used as an incendiary agent. Because it is incendiary, soldiers should use caution to prevent fires that would be detrimental to tactical operations.

a. **Body**. The body of the MK1 illumination grenade is sheet metal.

b. **Filler**. The filler has 3.5 ounces of illuminating pyrotechnic composition.

c. **Fuze**. The fuze is a special igniter, which differs from other igniting type fuzes in that it contains a quick match rather than a powder delay train. The quick match has a burning time of 7 seconds, after which it sets off an igniter charge. The igniter charge initiates the burning process of the grenade's filler.

d. **Weight**. The grenade weighs 10 ounces.

e. **Capabilities**. The average soldier can throw the MK1 40 meters. The filler burns for 25 seconds, producing 55,000 candlepower and illuminating an area 200 meters in diameter.

f. **Color and Markings**. Older MK1 grenades are white with black markings; newer models are unpainted with black markings.

WARNING

Avoid looking directly at the illumination grenade as it burns, since the intensity of the light may damage the retina.

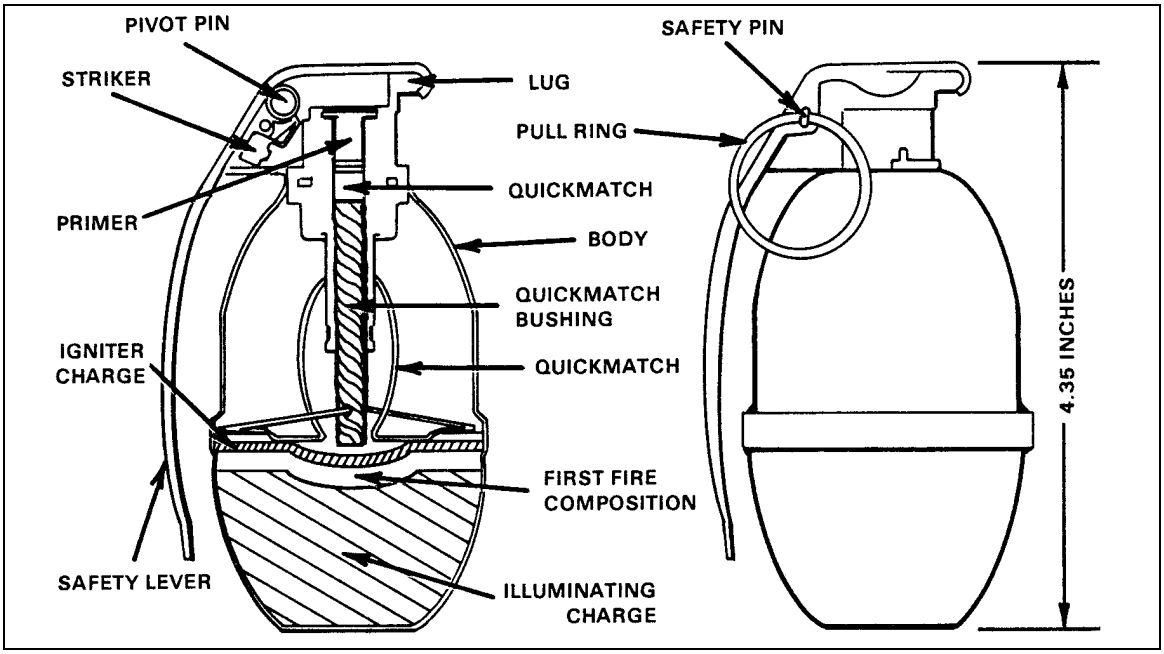

Figure E-2. MK1 illumination pyrotechnic hand grenade.

E-3. MK2 FRAGMENTATION HAND GRENADE

The MK2 (Figure E-3) is used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high-velocity projection of fragments.

a. **Body**. The MK2 grenade body is cast iron.

b. **Filler**. The filler has TNT, either flaked or granular.

c. **Fuze**. The fuze is an M204A1 or M204A2.

d. **Weight**. The grenade weighs 21 ounces.

e. **Capabilities**. The average soldier can throw the grenade 30 meters. The MK2 grenade has a bursting radius of 10 meters.

f. **Color and Markings**. The grenade has an olive drab body with a single yellow band, which indicates a high-explosive filler.

WARNING

If the fuze is loose, do not try to tighten it. This could set off the granular TNT in the grenade.

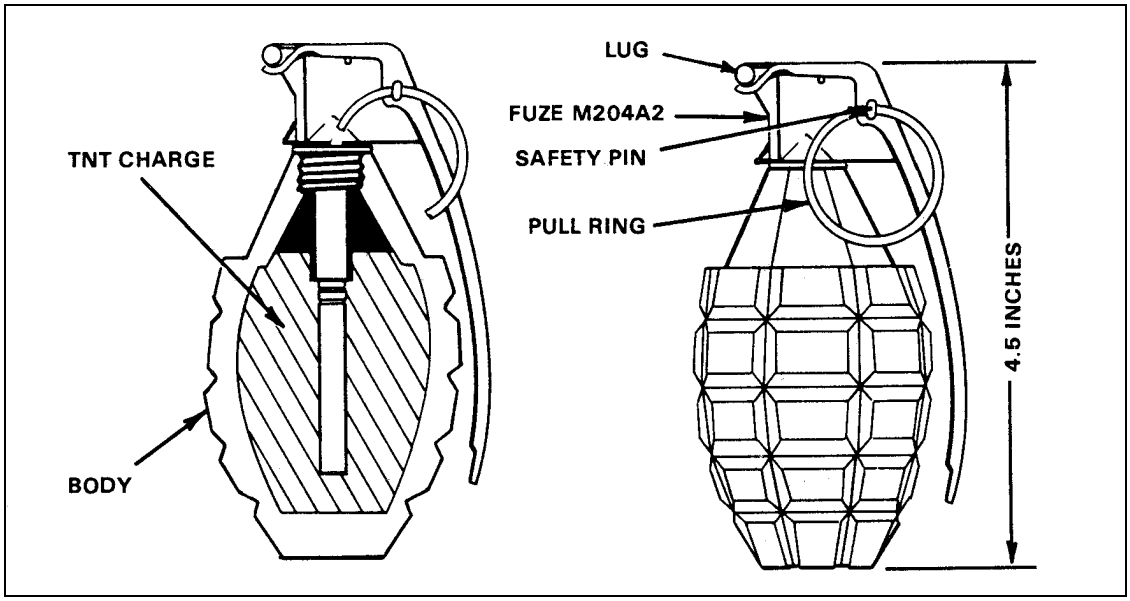

Figure E-3. MK2 fragmentation hand grenades.

E-4. M26 AND M26A1 FRAGMENTATION HAND GRENADES

These grenades (Figure E-4) are used to supplement small arms fire against an enemy in close combat. They produce casualties through the high-velocity projection of fragments.

a. **Body**. The M26 and M26A1 grenade bodies are cast iron.

b. **Filler**. The fillers have TNT, either flaked or granular.

c. **Fuze**. The fuze is an M204A1 or M204A2.

d. **Weight**. Each grenade weighs 21 ounces.

e. **Capabilities**. The average soldier can throw these grenades 40 meters. They have an effective casualty radius of 15 meters.

f. **Color and Markings**. These grenades have an olive drab body with a single yellow band at the top and yellow markings, which indicate a high-explosive filler.

WARNING

Although the casualty-producing radius of the M26 grenade is 15 meters, fragments can disperse out to 230 meters.

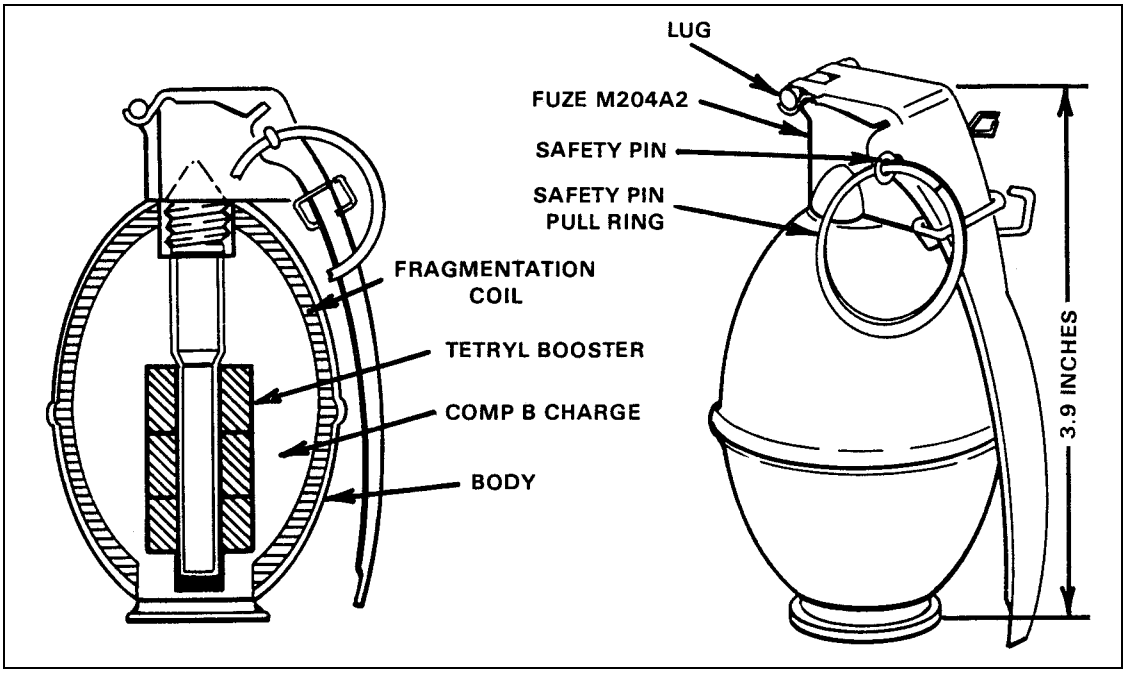

Figure E-4. M26 and M26A1 fragmentation hand grenade.

E-5. M7 AND M7A1 CN RIOT-CONTROL HAND GRENADES

The M7 and M7A1 grenades (Figure E-5) contain only CN (tear gas) filler. The two grenades differ in the amount of filler they contain.

a. **Body**. The M7 and M7A1 grenade bodies are sheet metal. The M7 has six emission holes at the top and two rows of nine emission holes each along the sides. The M7A1 has four emission holes at the top and one at the bottom.

b. **Filler**. The M7 grenade has 10.25 ounces of CN; the M7A1 has 12.5 ounces of CN.

c. **Fuze**. The fuze is an M201A1.

d. **Weight**. The M7 grenade weighs 17 ounces; the M7A1 weighs 18.5 ounces.

e. **Capabilities**. The average soldier can throw either grenade 35 meters. The grenades produce a dense cloud of irritant agent for 20 to 60 seconds.

f. **Color and Markings**. Each grenade has a gray body with a single red band and red markings.

WARNING

Friendly forces should don protective masks before using these grenades.

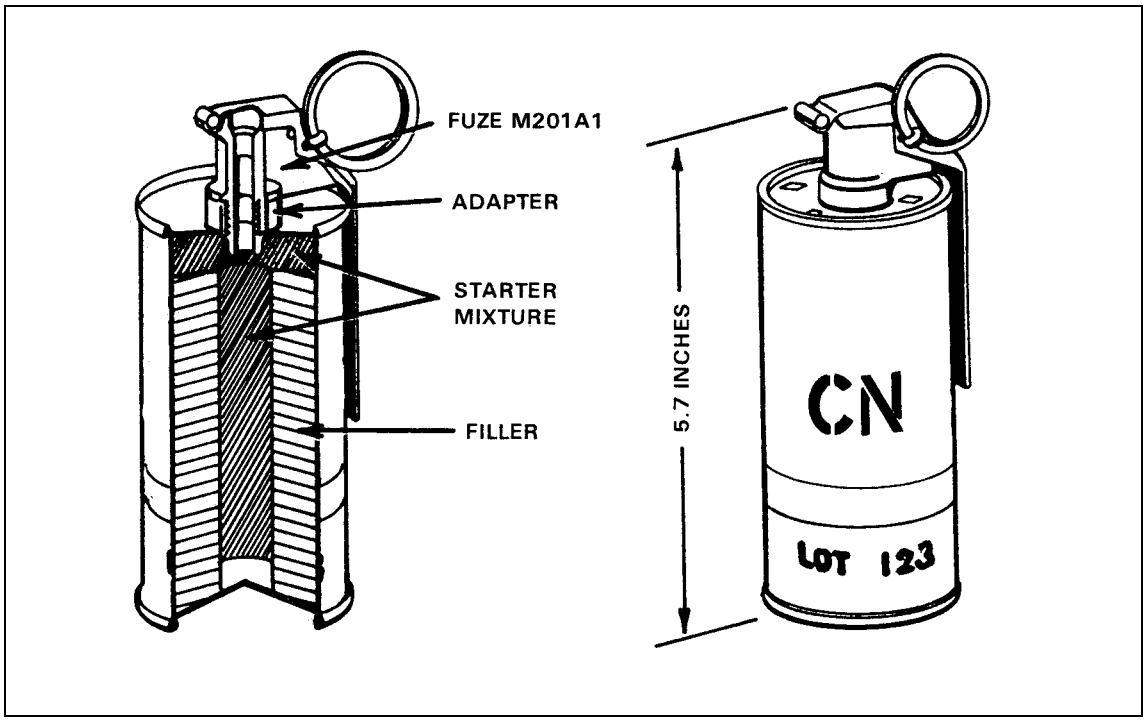

Figure E-5. M7 and M7A1 tear gas hand grenade.

E-6. M6 AND M6A1 CN-DM RIOT-CONTROL HAND GRENADES

The M6 and M6A1 grenades (Figure E-6) contain a combination mixture of CN and DM. They differ chiefly in external appearance and the manner in which the filler is combined.

a. **Body**. The M6 and M6A1 grenade bodies are sheet metal. The M6 has six emission holes at the top and two rows of nine emission holes each along the sides. The M6A1 has four emission holes at the top and one at the bottom.

b. **Filler**. The M6 grenade has 10.5 ounces of CN-DM mixture; the M6A1 has 9.5 ounces of CN-DM mixture.

c. **Fuze**. The fuze is an M201A1.

d. **Weight**. The M6 grenade weighs 17 ounces; the M6A1 weighs 20 ounces.

e. **Capabilities**. The average soldier can throw either grenade 35 meters. The grenades emit a dense cloud of irritant agent for 20 to 60 seconds

f. **Color and Markings**. These grenades have gray bodies with a single red band and red markings. (Under the standard color-coding system, the single red band and markings indicate nonpersistent riot-control filler. A double red band and markings indicate persistent riot-control filler, and any combination of green bands and markings indicates casualty-producing filler. Currently, there are no casualty-producing agents in hand grenade form.)

WARNING

Friendly forces should don protective masks before using these grenades.

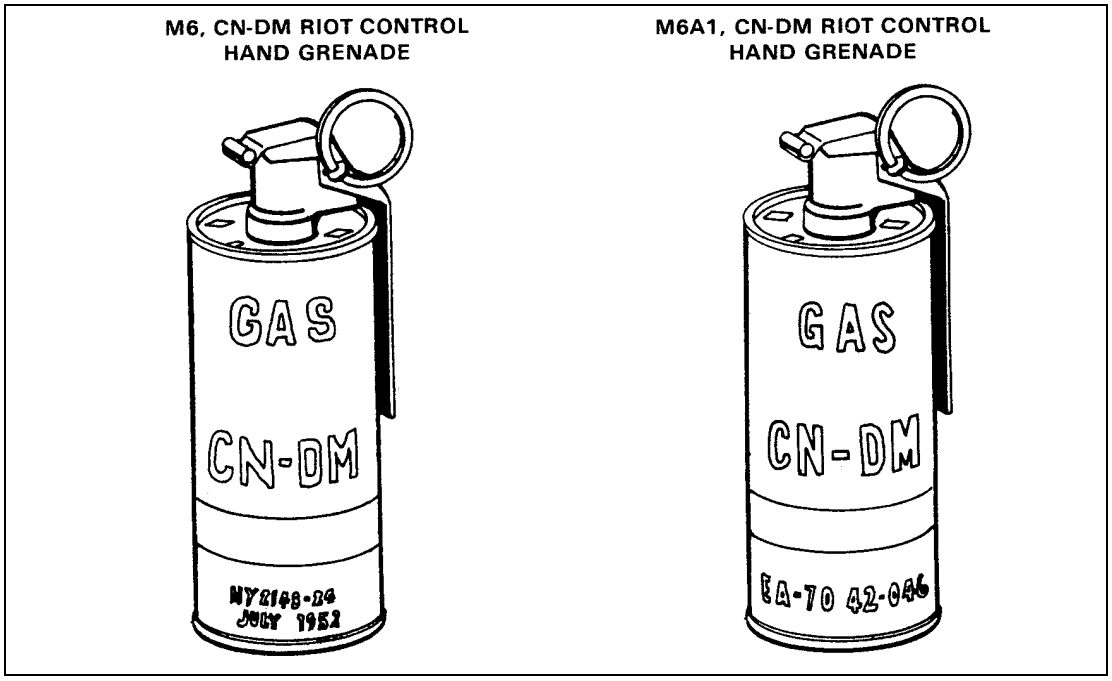

Figure E-6. M6 and M6A1 riot-control hand grenade.

E-7. ABC-M25A1 AND ABC-M25A2 RIOT-CONTROL HAND GRENADES

The ABC riot-control hand grenade is a bursting munition with an integral fuze (Figure E-7). The M25A2 grenade is an improved version of the M25A1 grenade. The two types of grenades differ primarily in body construction. They are used to deliver all three types of riot-control agents presently used in hand grenades.

a. **Body**. The body of this grenade is compressed fiber or plastic sphere.

b. **Filler**. The fillers of the M25 series of riot-control hand grenades vary in weight and composition according to the type of agent contained in the grenade. All fillers are mixed with silica aerosol for increased dissemination efficiency.

c. **Fuze**. The fuze type is integral.

d. **Weight**. Each grenade weighs 7.5 to 8 ounces, depending on the type of filler.

e. **Capabilities**. The average soldier can throw the grenade 50 meters. The M25 series of riot-control hand grenades have a radius burst (visible cloud grenade) of about 5 meters, but fragments of the grenade are occasionally projected up to 25 meters.

f. **Color and Markings**. The color and markings are the same as the M6 and M6A1 grenades (paragraph E-6f). Most grenades of the M25 series currently in use are not painted according to any color-coding system. They are either totally unpainted or have only a red band and red markings.

WARNING

When the ABC-M25A1 grenade is employed, do not drop it because it may go off immediately. Do not attempt to replace a pulled safety pin and do not relax thumb pressure arming sleeve after the safety pin is pulled. Friendly forces should don protective masks before using these grenades.

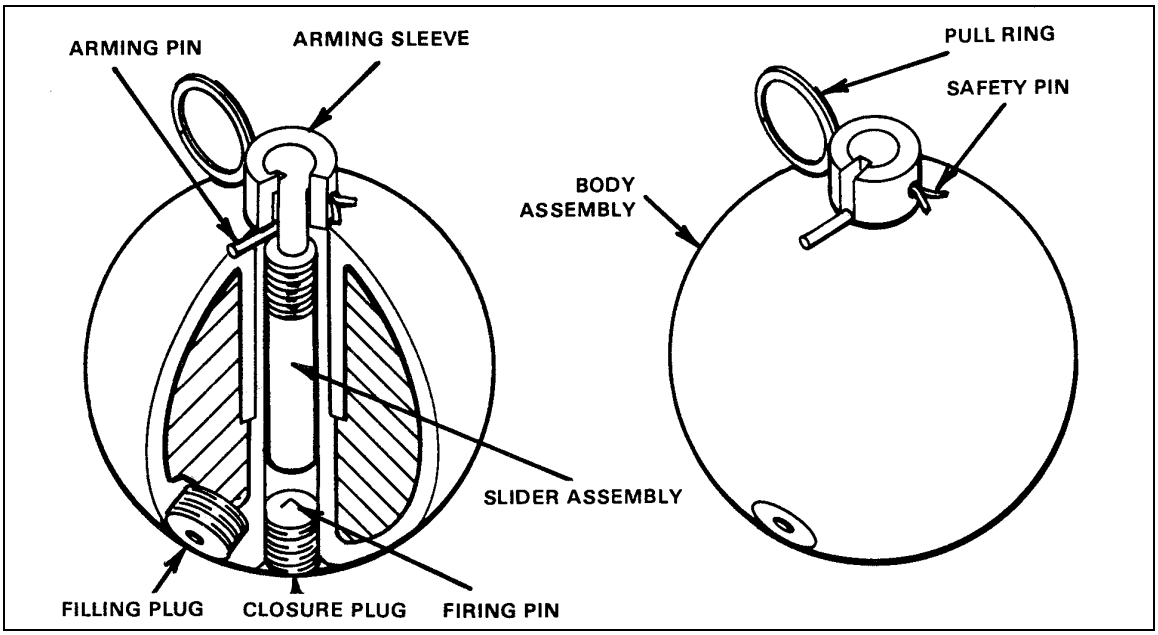

Figure E-7. The ABC-M25A1 riot-control hand grenade.

E-8. M34 WHITE PHOSPHORUS HAND GRENADE

The M34 chemical smoke grenade is the most versatile of all hand grenades (Figure E-8). The grenade can be used for signaling, screening, or incendiary missions, or for producing casualties. The use of this grenade also has a psychological impact on the enemy.

a. **Body**. The M34 WP grenade body is compressed fiber or plastic sphere.

b. **Filler**. The filler has 15 ounces of white phosphorous.

c. **Fuze**. The fuze is an M206A2.

d. **Weight**. The grenade weighs 27 ounces.

e. **Capabilities**. The average soldier can throw the grenade 30 meters. The grenade has a bursting radius of 35 meters. All friendly personnel within this 35-meter area should be in a covered position to avoid being struck by burning particles. The WP filler burns for about 60 seconds at a temperature of 5,000 degrees Fahrenheit. This intense heat causes the smoke produced by the grenade to rise rapidly, especially in cool climates, making the M34 grenade less desirable for use as a screening agent. (The M15 WP smoke hand grenade is similar to the M34. For more information, refer to TM 9-1330-200-12.)

f. **Color and Markings**. Under the old ammunition color-coding system, the white phosphorous grenade is light gray with a single yellow band and yellow markings. Under the new standard color-coding system, the M34 grenade is light green with a single yellow band and light red markings.

NOTE: Most M34 WP smoke hand grenades presently in use were manufactured before the standard color-coding system agreement and are painted according to the old color code.

WARNING

The M34 has a bursting radius of 35 meters, which is farther than the average soldier can throw it; therefore, the thrower must be in a covered or protected position.

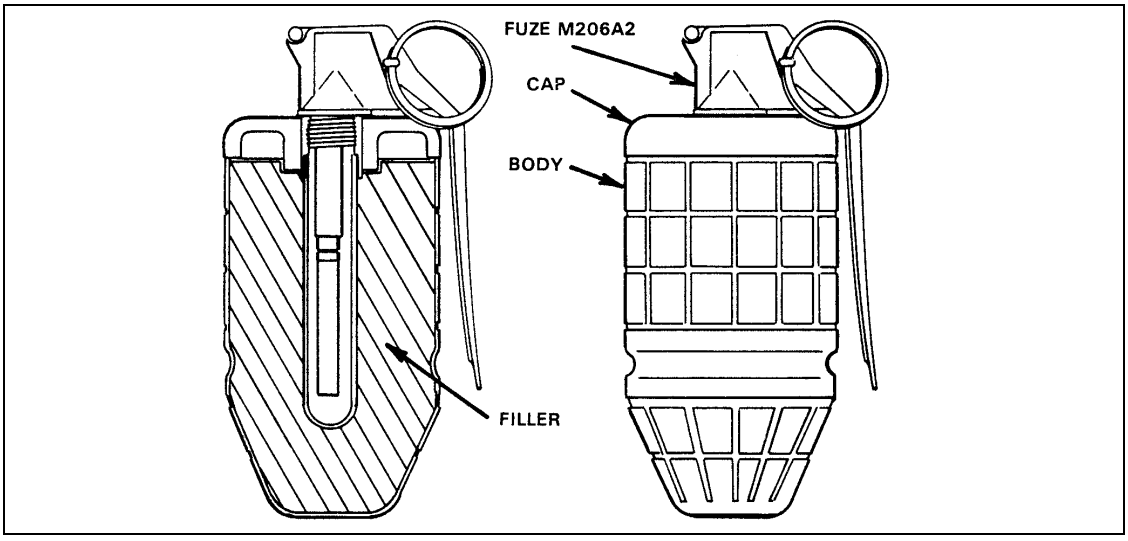

Figure E-8. M34 WP smoke hand grenade.

E-9. AN-M8 HC WHITE SMOKE

This grenade is used to produce dense clouds of white smoke for signaling and screening (Figure E-9).

a. **Body**. The grenade body is a sheet steel cylinder.

b. **Filler**. The filler has 19 ounces of Type C, HC smoke mixture.

c. **Fuze**. The fuze is an M201A1.

d. **Weight**. The grenade weighs 24 ounces.

e. **Capabilities**. The average soldier can throw the AN-M8 30 meters. The grenade emits a dense cloud of white smoke for 105 to 150 seconds.

f. **Color and Markings**. The grenade has a light green body with black markings and a white top.

WARNING

THE AN-M8 HAND GRENADE PRODUCES HARMFUL HYDROCHLORIC FUMES THAT IRRITATE THE EYES, THROAT, AND LUNGS. IT SHOULD NOT BE USED IN CLOSED-IN AREAS UNLESS SOLDIERS ARE WEARING PROTECTIVE MASKS.

WARNING

ANY DAMAGED AN-M8 HC GRENADES THAT EXPOSE THE FILLER ARE HAZARDOUS. EXPOSURE OF THE FILLER TO MOISTURE AND AIR COULD RESULT IN A CHEMICAL REACTION THAT WILL IGNITE THE GRENADE.

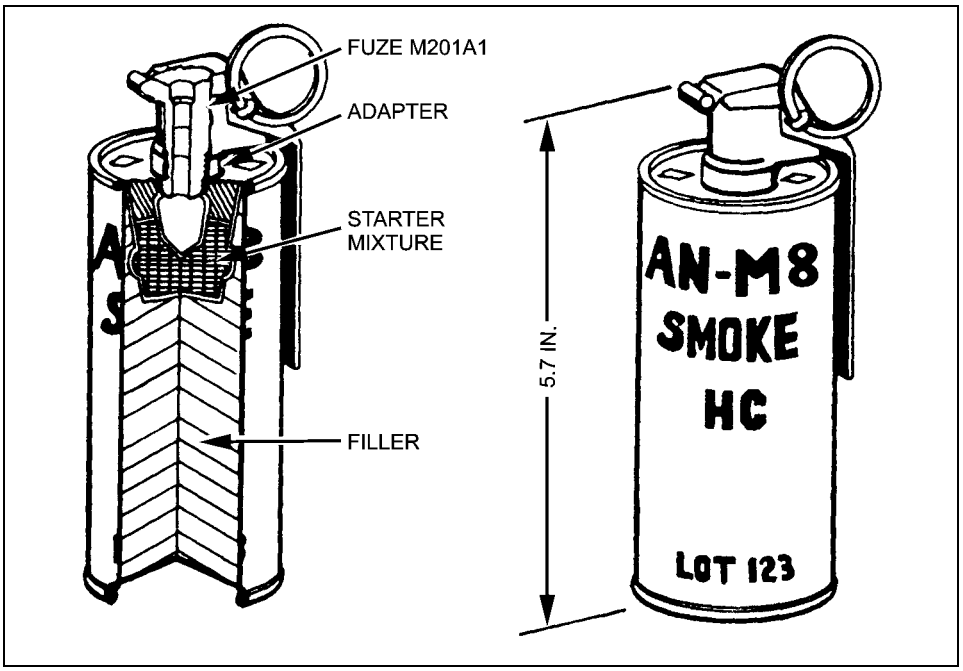

Figure E-9. AN-M8 HC white smoke grenade.

E-10. SAFETY CLIPS

Improvements have been made in safety clips. There are four types of safety clips that might be encountered on the obsolete grenades (Figure E-10).

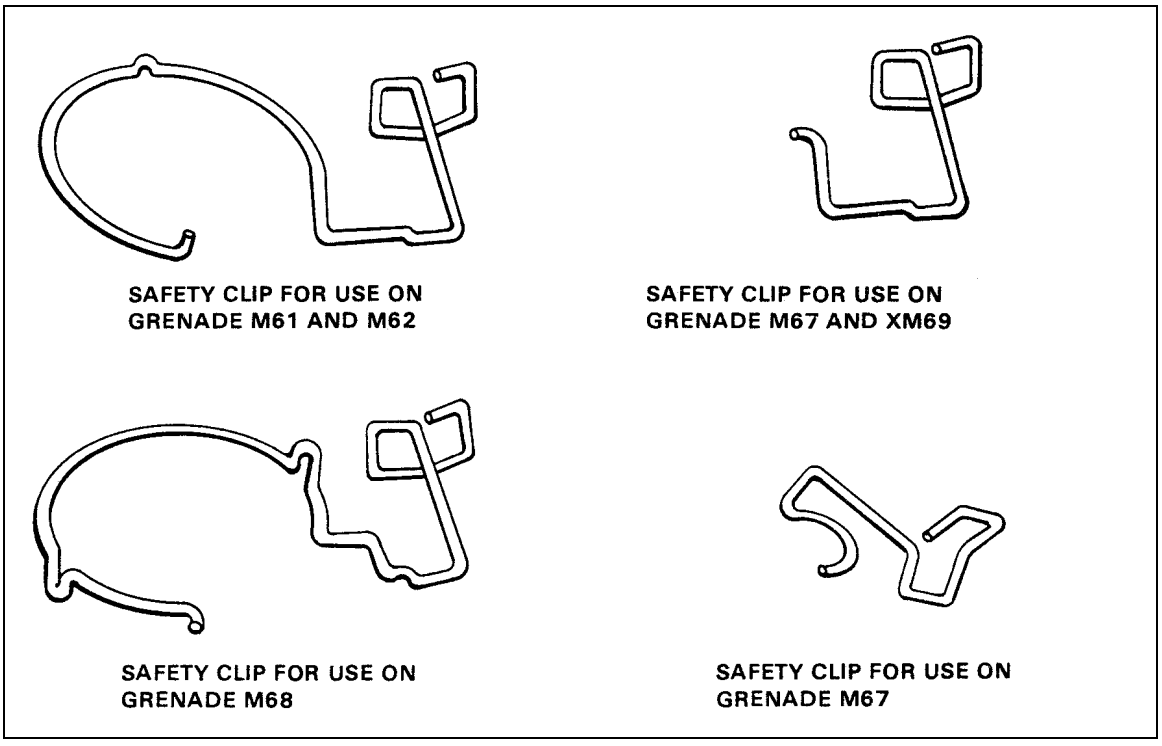
SAFETY CLIP FOR USE ON GRENADE M61 AND M62
SAFETY CLIP FOR USE ON GRENADE M67 AND XM69
SAFETY CLIP FOR USE ON GRENADE M68
SAFETY CLIP FOR USE ON GRENADE M67

Figure E-10. Safety clips on obsolete grenades.

APPENDIX F

NATO HAND GRENADES

This appendix provides general information on the identification, functions, and capabilities of NATO hand grenades. The North Atlantic Treaty Organization nations have an extensive inventory of grenades. This appendix describes only the more common grenades that the US soldier might encounter during joint operations.

Section I. NETHERLANDS

F-1. NR17

- Type: Offensive. (Figure F-1)
- Weight: 475 grams.
- Length: 125 millimeters.
- Diameter: 56 millimeters.
- Body Material: Plastic.
- Fuze Type: Striker release.
- Filler Material: TNT.
- Filler Weight: 205 grams.
- Fuze Delay: 3-4 seconds.
- Effective Radius: 5 meters.
- Range Thrown: 30 to 40 meters.

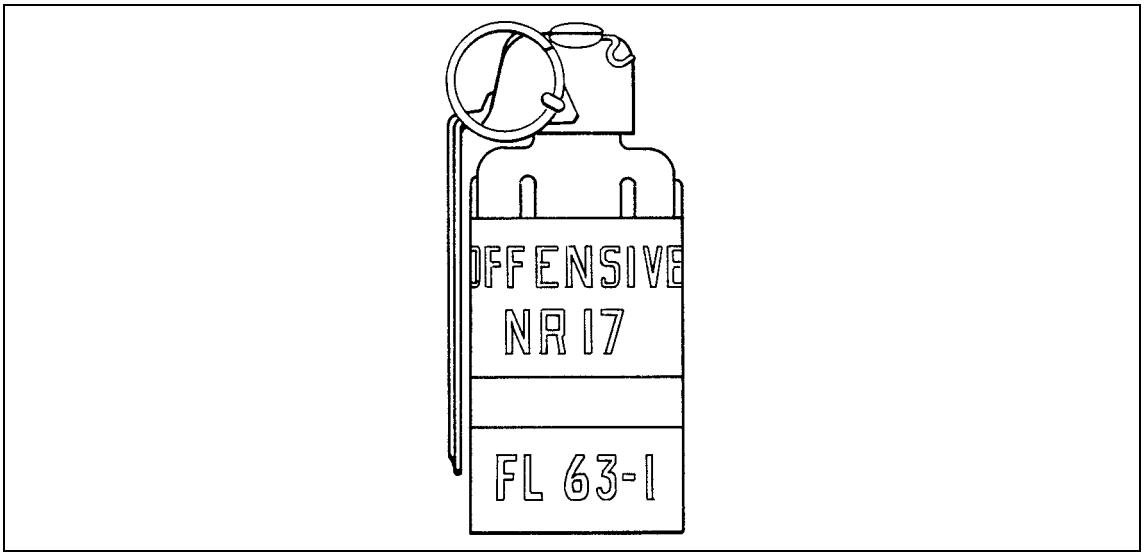

Figure F-1. NR17 hand grenade.

F-2. NR13C1

- Type: Fragmentation, offensive. (Figure F-2)
- Weight: 475 grams.
- Length: 143 millimeters.
- Diameter: 54 millimeters.
- Body Material: Steel.
- Filler Weight: 225 grams.
- Filler Material: High explosive.
- Fuze Type: Pyrotechnic delay.
- Fuze Delay: 5 seconds.
- Range Thrown: 30 meters.

Figure F-2. NR13C1 fragmentation hand grenade.

F-3. MARK 2

- Type: Fragmentation. (Figure F-3)
- Length: 114 millimeters.
- Diameter: 57 millimeters:
- Body Material: Cast iron.
- Filler Weight: 55 grams.
- Filler Material: TNT powdered.
- Fuze Type: Pyrotechnic delay.
- Fuze Delay: 3 seconds.

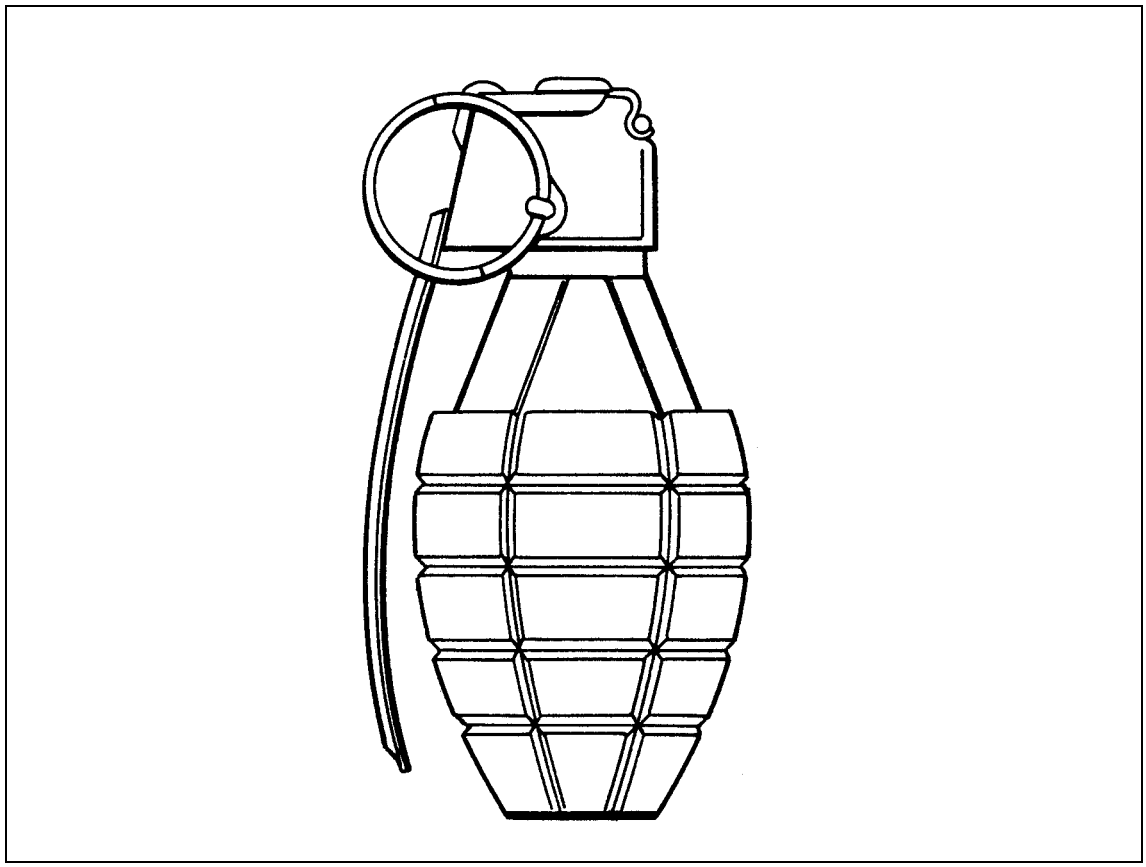

Figure F-3. Mark 2 fragmentation hand grenade.

F-4. NR1C1

- Type: Fragmentation. (Figure F-4)
- Weight: 670 grams.
- Length: 122 millimeters.
- Body Material: Cast iron.
- Filler Weight: 55 grams.
- Filler Material: TNT powdered.
- Fuze Type: Pyrotechnic delay.
- Fuze Delay: 3 seconds.

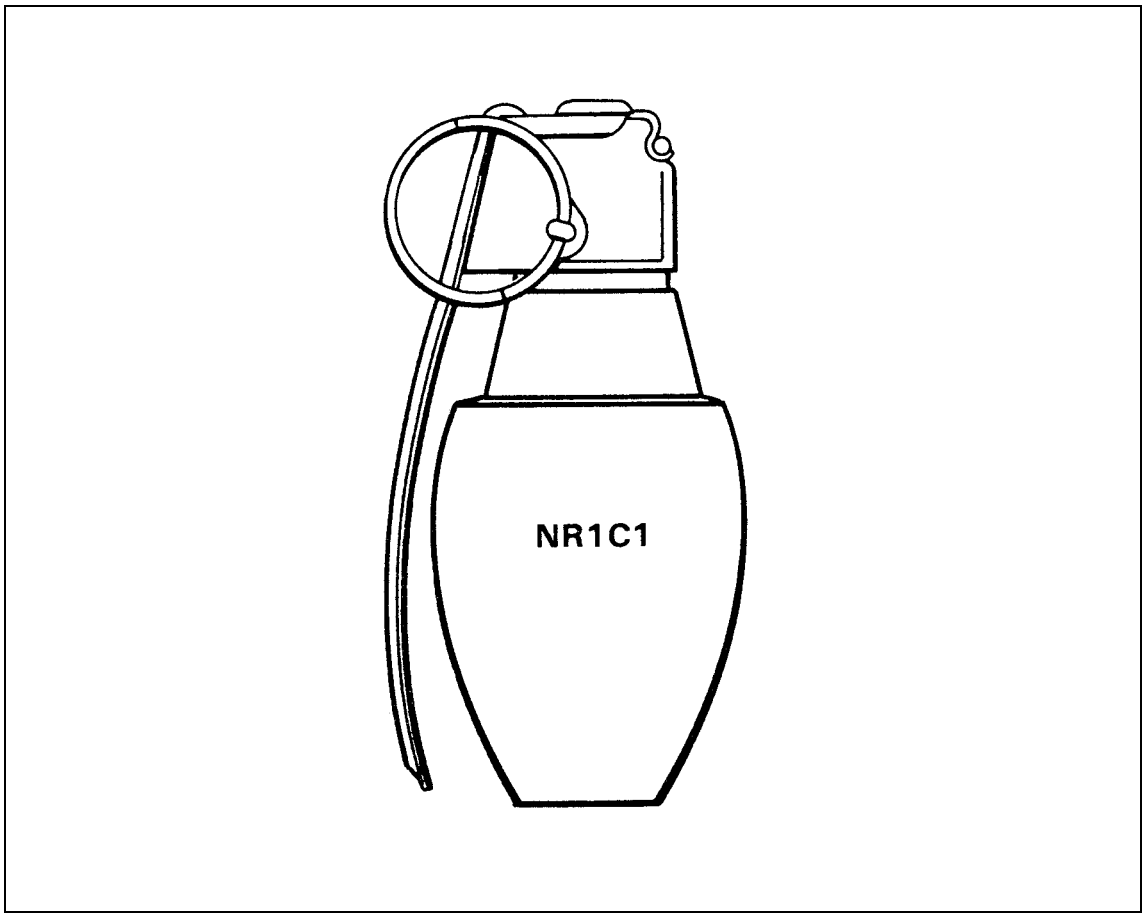

Figure F-4. NR1C1 fragmentation hand grenade.

F-5. JNS 62-65

- Type: Smoke. (Figure F-5)
- Weight: 660 grams.
- Length: 151 millimeters.
- Diameter: 63 millimeters.
- Body Material: Tinned steel.
- Filler Material: Colored smoke.
- Fuze Delay: 2 to 3 seconds.
- Burn Time: 1 to 2 minutes.

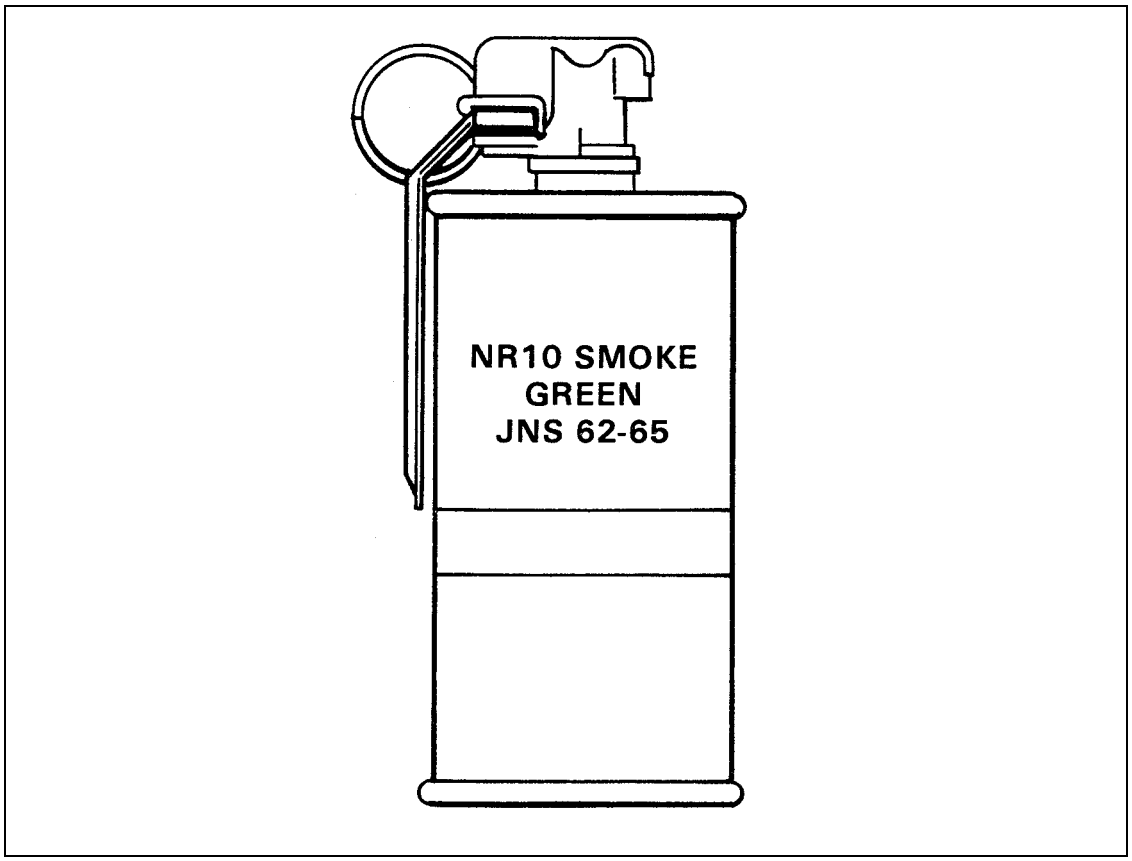

Figure F-5. JNS 62-65 smoke hand grenade.

F-6. NR12

- Type: Incendiary. (Figure F-6)
- Weight: 820 grams.
- Length: 153 millimeters.
- Diameter: 63 millimeters.
- Body Material: Tinned steel.
- Filler Material: Thermite.
- Fuze Type: Striker release.
- Fuze Delay: 1 to 3 seconds.
- Range Thrown: 40 meters.
- Burn Time: 40 seconds.
- Peak Intensity: 2200°C

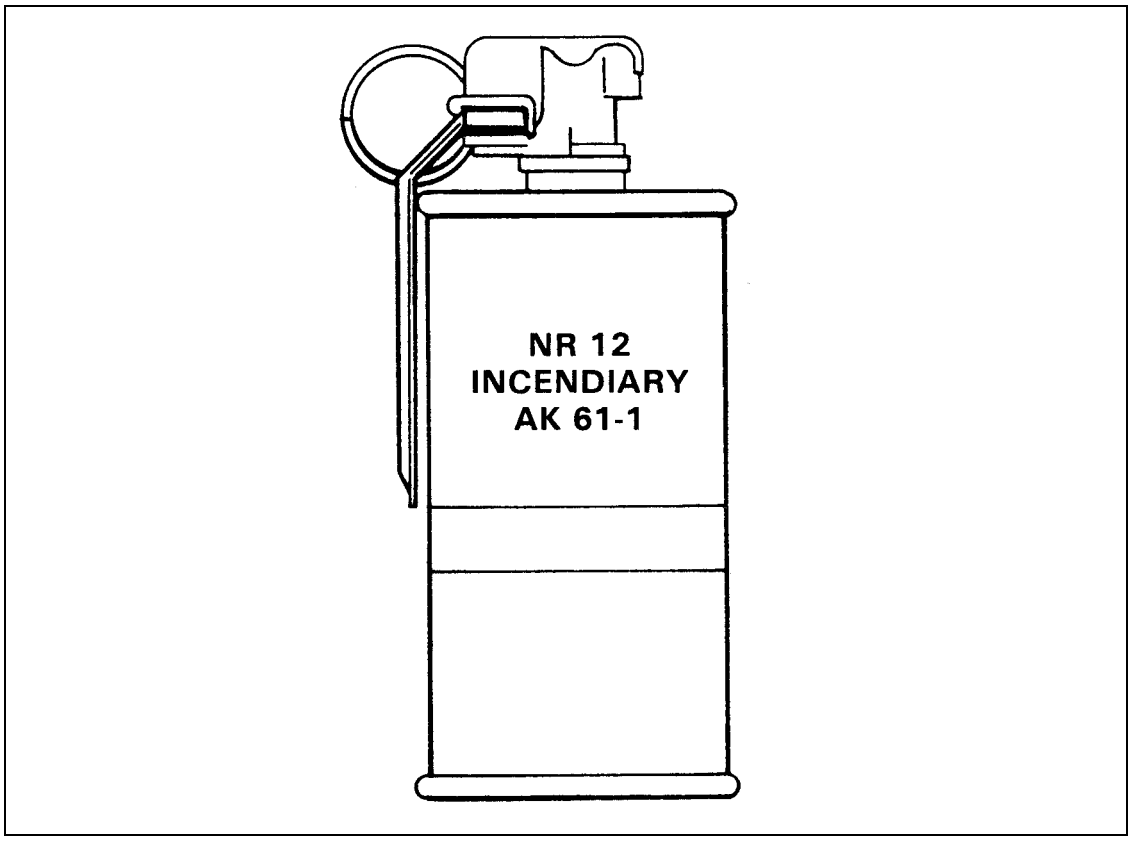

Figure F-6. NR12 incendiary hand grenade.

F-7. NR16

- Type: Smoke. (Figure F-7)
- Weight: 284 grams.
- Length: 101 millimeters.
- Diameter: 50 millimeters.
- Body Material: Tinned Steel.
- Filler Material: White phosphorus.
- Fuze Type: Delay.
- Fuze Delay: 4 seconds.
- Range Thrown: 37 meters.

Figure F-7. NR16 smoke hand grenade.

F-8. NR20C1

- Type: Fragmentation. (Figure F-8)
- Weight: 390 grams.
- Length: 103 millimeters.
- Diameter: 60 millimeters.
- Body Material: Plastic.
- Filler Weight: 150 grams.
- Filler Material: Composition B.
- Fuze Type: Striker release.
- Fuze Delay: 3 to 4 seconds.
- Lethal Radius: 5 meters, safety range 15 to 20 meters.

Figure F-8. NR20C1 fragmentation hand grenade.

Section II. GERMANY

F-9. DM 24/68

- Type: Incendiary smoke. (Figure F-9)
- Weight: 340 grams.
- Length: 133 millimeters.
- Diameter: 67 millimeters.
- Body Material: Plastic.
- Filler Weight: 255 grams.
- Filler Material. Red phosphorus.
- Fuze Type: Mechanical ignition.
- Fuze Delay: 2.5 seconds after ignition.
- Burn Time: 5 minutes.

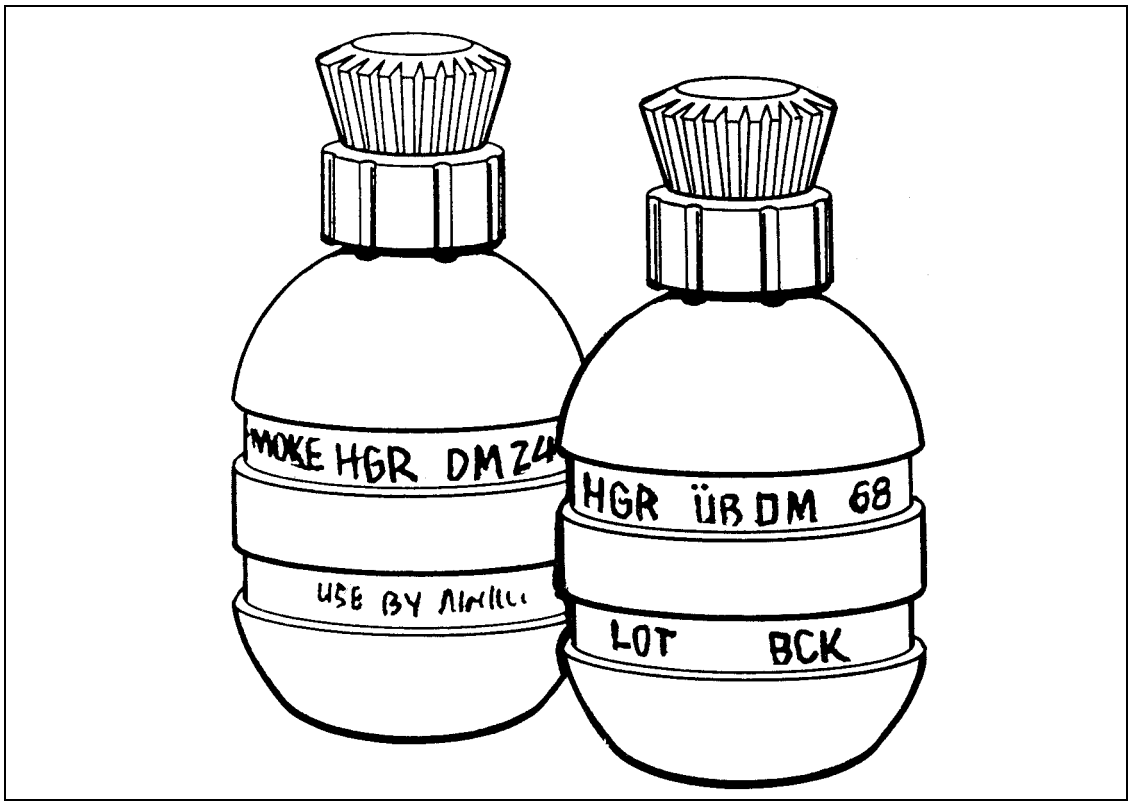

Figure F-9. DM 24/68 incendiary hand grenade.

F-10. HC DM 15

- Type: Smoke. (Figure F-10)
- Weight: 1,200 grams.
- Length: 175 millimeters.
- Diameter: 76 millimeters.
- Body Material: Hexachlorethane.
- Fuze Type: Mechanical ignition.
- Fuze Delay: 2.5 seconds after ignition.
- Burn Time: 2.5 minutes.

Figure F-10. HC DM 15 smoke hand grenade.

F-11. M-DN 11

- Type: Fragmentation, defensive. (Figure F-11)
- Weight: 467 grams.
- Length: 97 millimeters.
- Diameter: 60 millimeters.
- Body Material: Plastic.
- Filler Weight: 43 grams, plasticized PETN.
- Fuze Type: Striker release.
- Fuze Delay: 3.5 to 4.5 seconds.

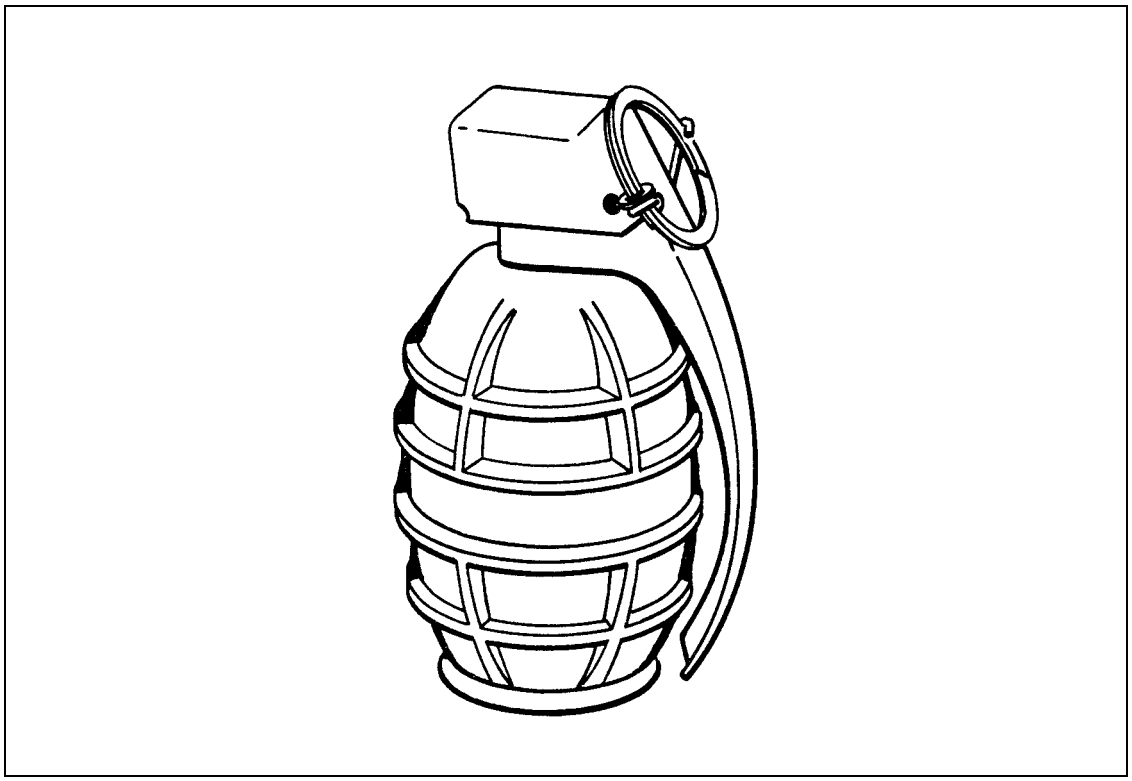

Figure F-11. M-DN 11 fragmentation hand grenade.

Section III. BELGIUM

F-12. 35X65 MECAR

- Type: Fragmentation, defensive. (Figure F-12)
- Weight: 230 grams.
- Length: 88 millimeters.
- Diameter: 35 millimeters.
- Body Material. Metal.
- Filler Material: Composition B.
- Fuze Type: Delay.
- Fuze Delay: 4 seconds.
- Range Thrown: 40 meters.
- Effective Radius: 10 meters.

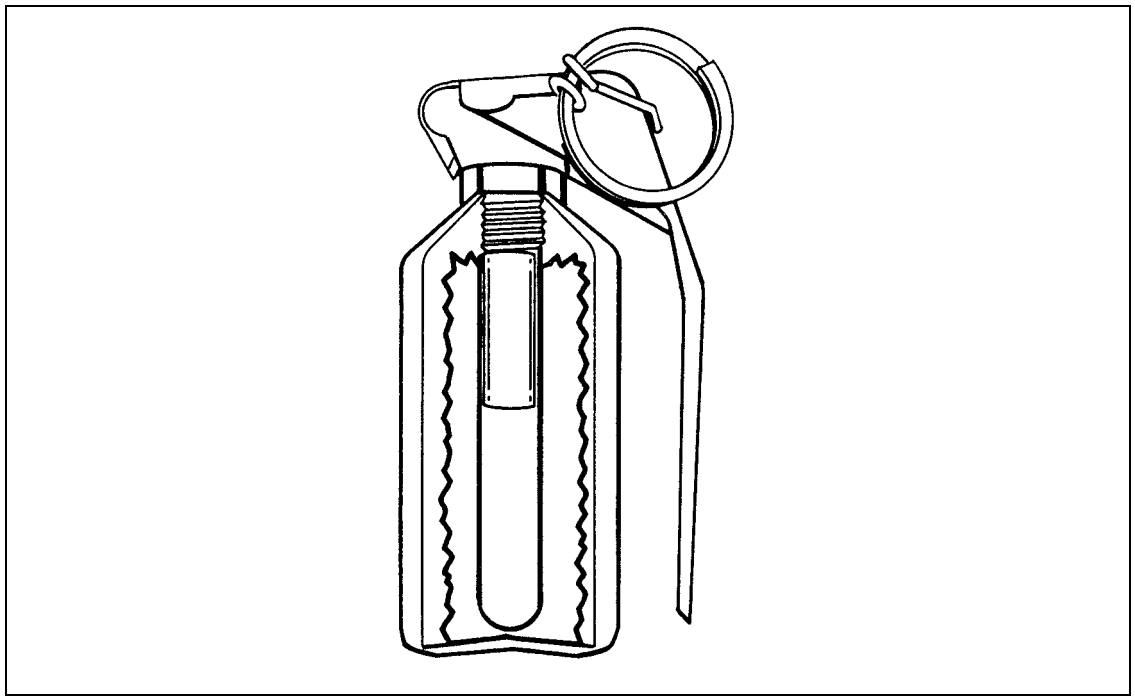

Figure F-12. 35X65 MECAR fragmentation hand grenade.

Section IV. UNITED KINGDOM

F-13. NO. 36M

- Type: Defensive. (Figure F-13)
- Weight: 600 grams.
- Length: 102 millimeters.
- Diameter: 60 millimeters.
- Body Material: Cast iron.
- Filler Weight: TNT, 60 grams.
- Fuze Type: Striker release.
- Fuze Delay: 3.5 to 4.5 seconds.
- Range Thrown: 25 meters.
- Effective Radius: 30 to 100 meters (40 fragments).

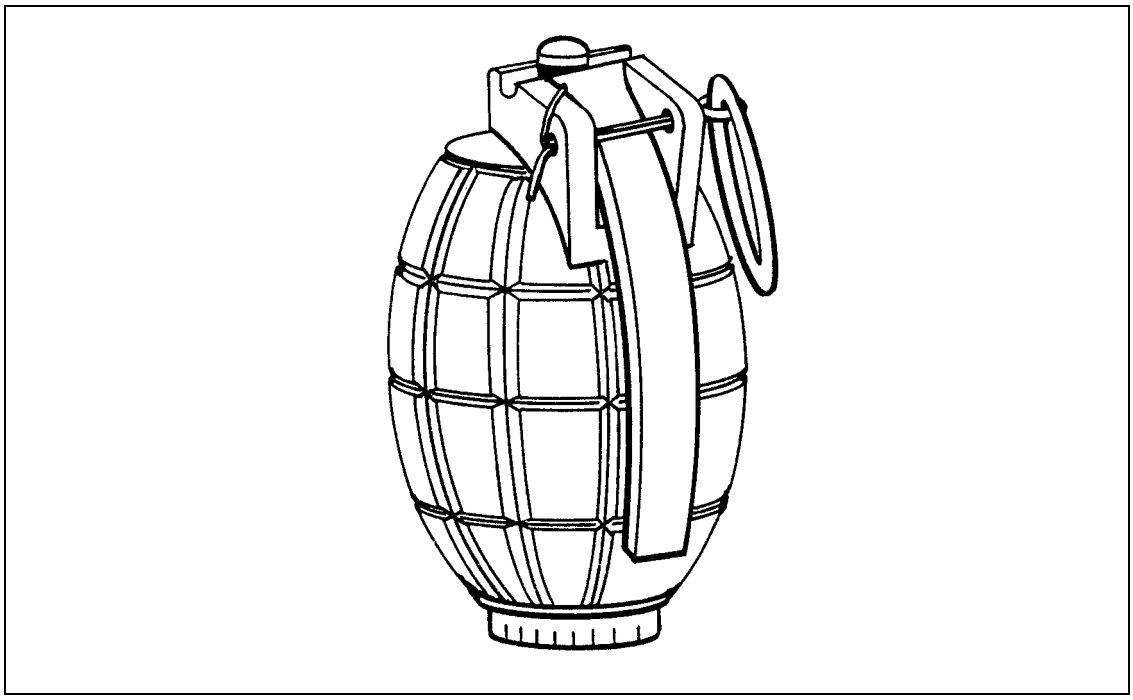

Figure F-13. No. 36M hand grenade.

F-14. PC1

- Type: Practice. (Figure F-14)
- Weight: 265 grams.
- Length: 95 millimeters.
- Diameter: 56 millimeters.
- Body Material: Soft plastic.
- Filler Weight: 80 grams.
- Filler Material: White powder.
- Fuze Type: Delay.
- Fuze Delay: 4.4 seconds + 0.5 seconds.
- Range Thrown: 40 meters.

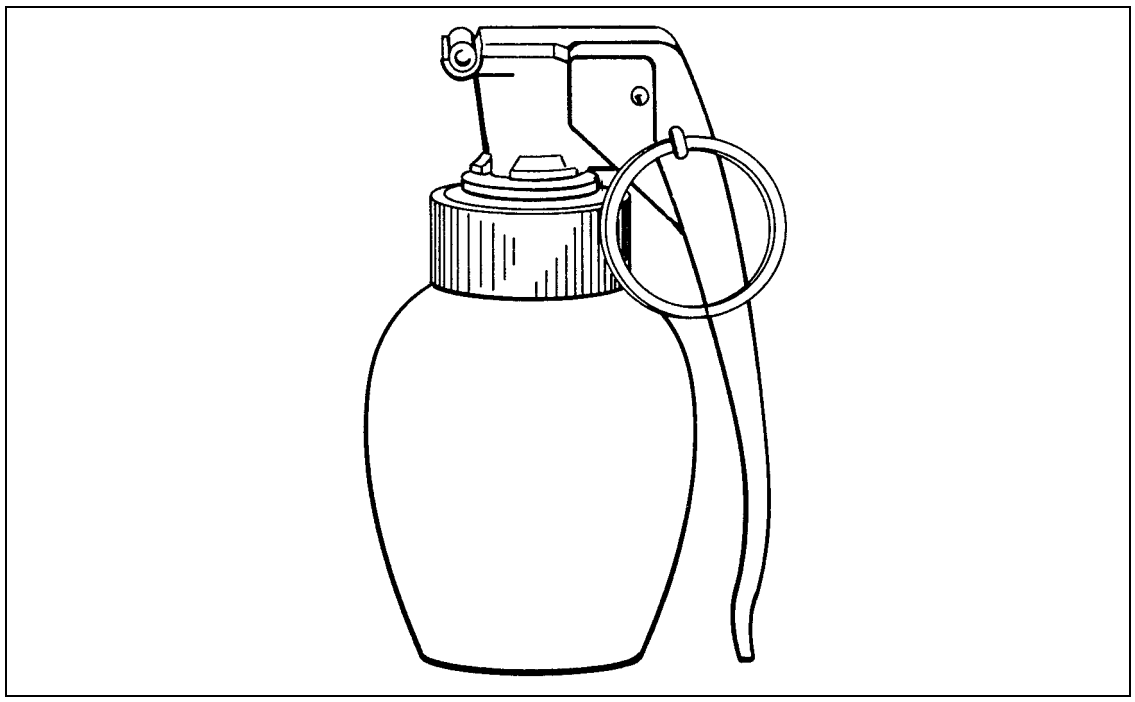

Figure F-14. PC1 practice hand grenade.

F-15. L2A2

- Type: Fragmentation. (Figure F-15)
- Weight: 395 grams.
- Length: 106 millimeters.
- Diameter: 60 millimeters.
- Body Material: Two-piece sheet-steel body with spiral wrapped fragmentation sleeve inside.
- Filler Material: RDX/TNT, 170 grams.
- Fuze Type: Striker release.
- Fuze Delay: 4 to 5 seconds.
- Range Thrown: 40 meters.
- Lethal Radius: 10 meters.

NOTE: Copy of US M26, being replaced by RO 01A1, a product improved model.

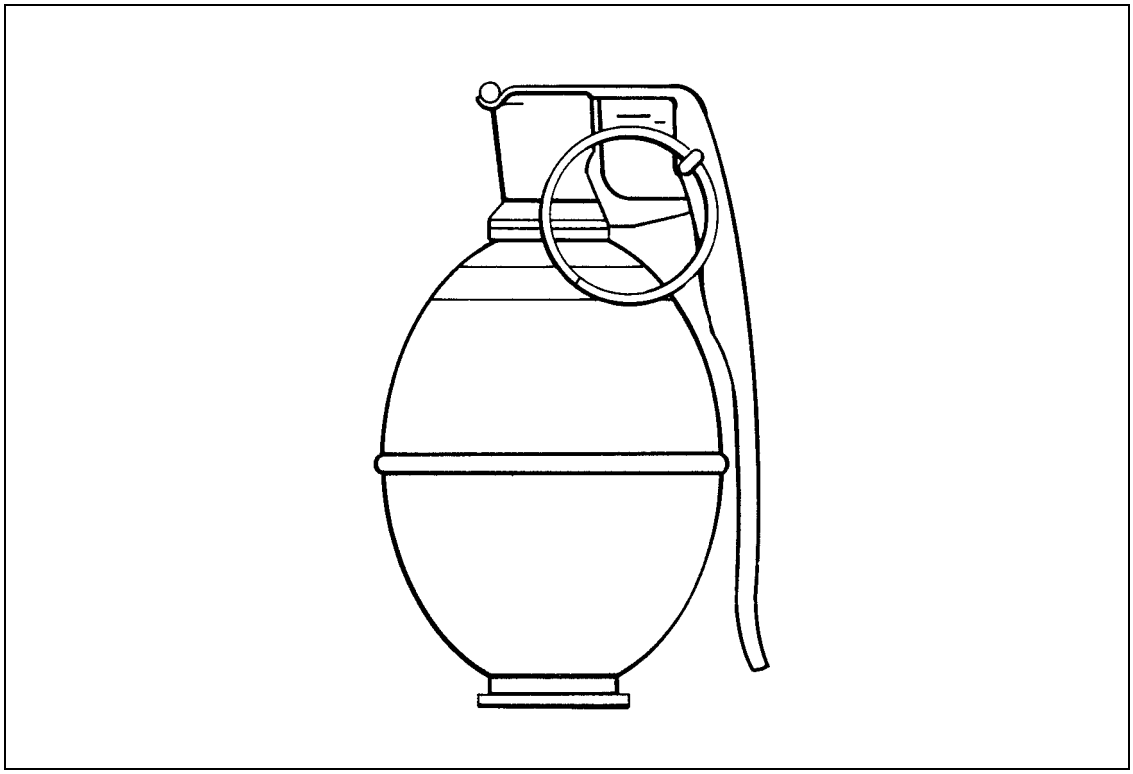

Figure F-15. L2A2 hand grenade.

F-16. NO. 83 N 201

- Type: Lachrymatory. (Figure F-16)
- Weight: 340 grams.
- Length: 135 millimeters.
- Diameter: 63 millimeters.
- Body Material: Tin.
- Filler Weight: 205 grams.
- Filler Material: CS, gas.
- Fuze Type: Striker release.
- Fuze Delay: 2 to 3 seconds.
- Range Thrown: 25 to 30 meters.
- Burn Time: About 25 seconds.

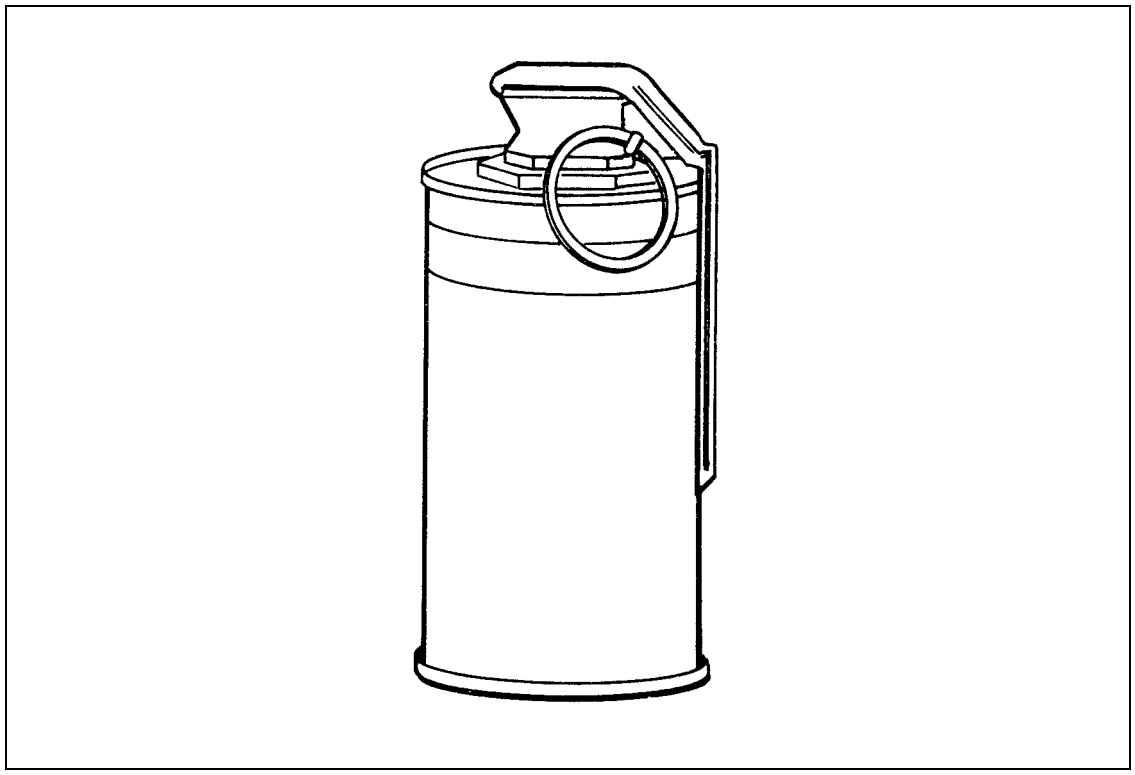

Figure F-16. No. 83 N 201 riot-control hand grenade.

F-17. RUBBER BURSTING CS

- Type: Riot control, L13A1 (N225 is similar). (Figure F-17)
- Weight: 550 Grams.
- Length: 175 millimeters.
- Diameter: 66 millimeters.
- Body Material: Rubber.
- Filler Weight: 470 grams.
- Filler Material: CS, 23 separate CS pellets.
- Fuze Type: Striker release.
- Fuze Delay: 2 to 2.4 seconds.
- Range Thrown: 25 to 35 meters.
- Burn Time: 12 seconds.
- Effective Radius: 15 meters.

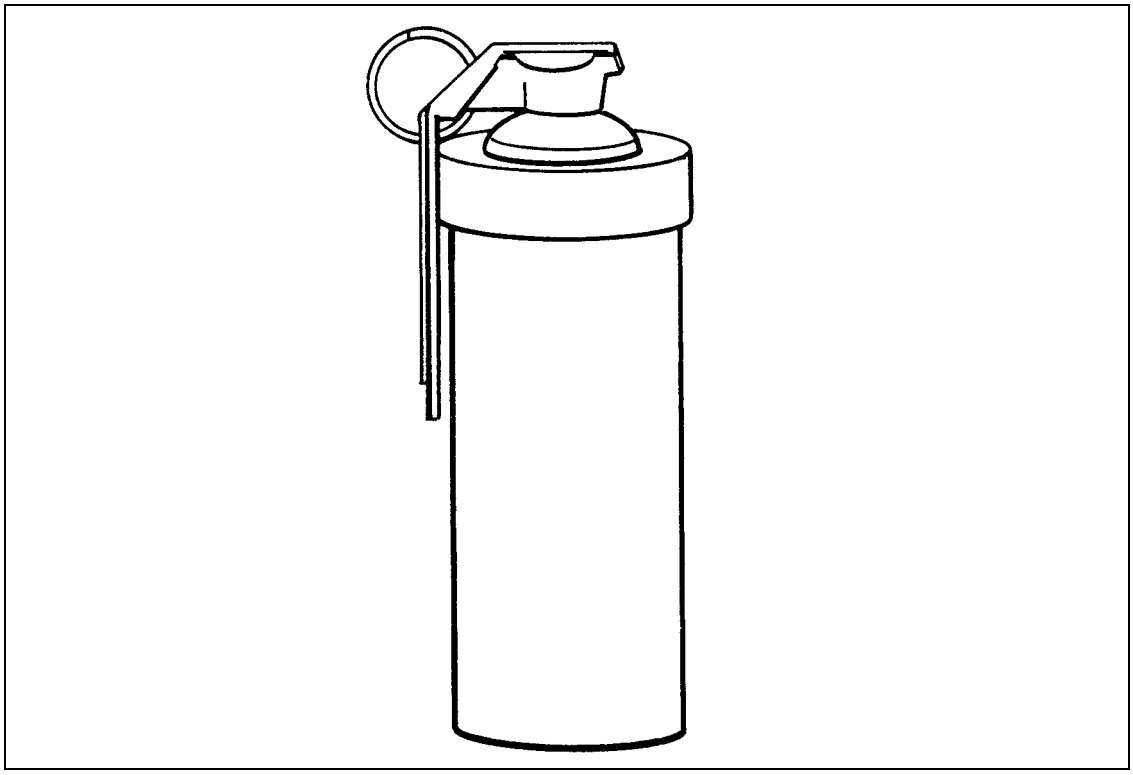

Figure F-17. Rubber bursting CS hand grenade.

Section V. AUSTRIA

F-18. SPL HGR 77

- Type: Defensive. (Figure F-18)
- Weight: 470 grams.
- Length: 96 millimeters.
- Diameter: 63 millimeters.
- Body Material: Rigid plastic.
- Filler Material: Plasticized PETN, 70 g.
- Fuze Type: Striker release.
- Fuze Delay: 3.5 to 4.5 seconds.
- Range Thrown: 45 meters.
- Effective Radius: 10 to 12 meters.

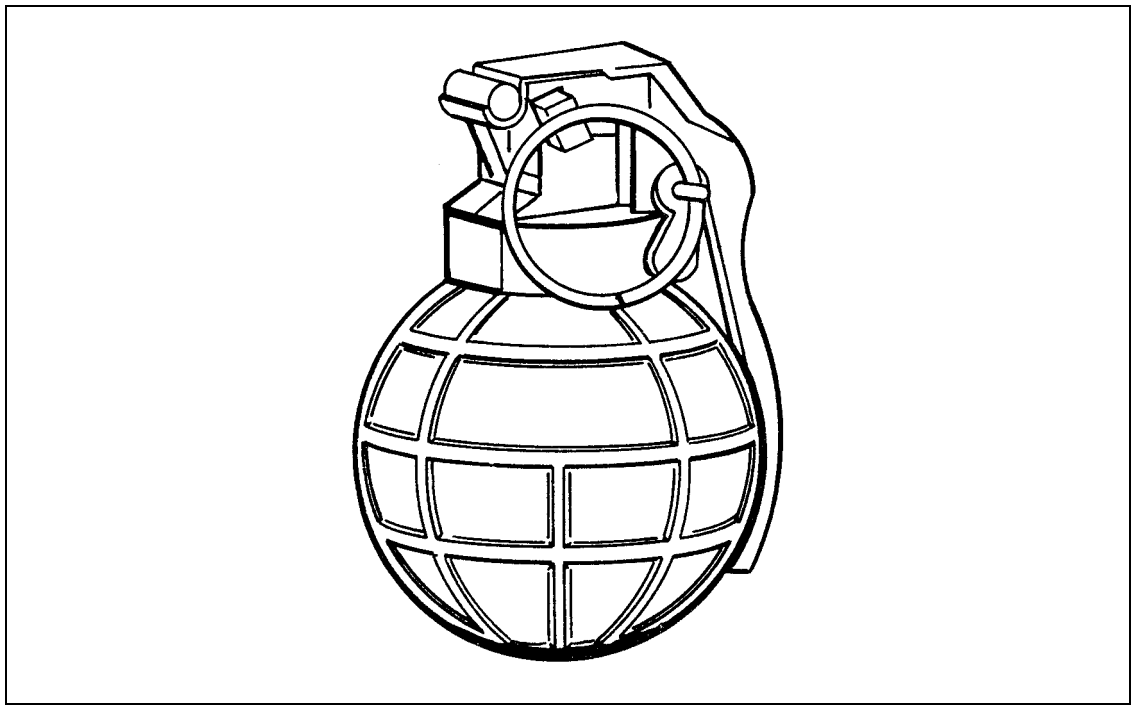

Figure F-18. Spl HGr 77 hand grenade.

F-19. HDGR 78

- Type: Defensive. (Figure F-19)
- Weight: 520 grams.
- Length: 115 millimeters.
- Diameter: 60 millimeters.
- Body Material: Plastic with steel pellets.
- Filler Weight: 70 grams.
- Filler Material: Plasticized PETN.
- Fuze Type: Striker release.
- Fuze Delay: 3 to 5 seconds.
- Range Thrown: 35 to 40 meters.
- Effective Radius: 10 meters.

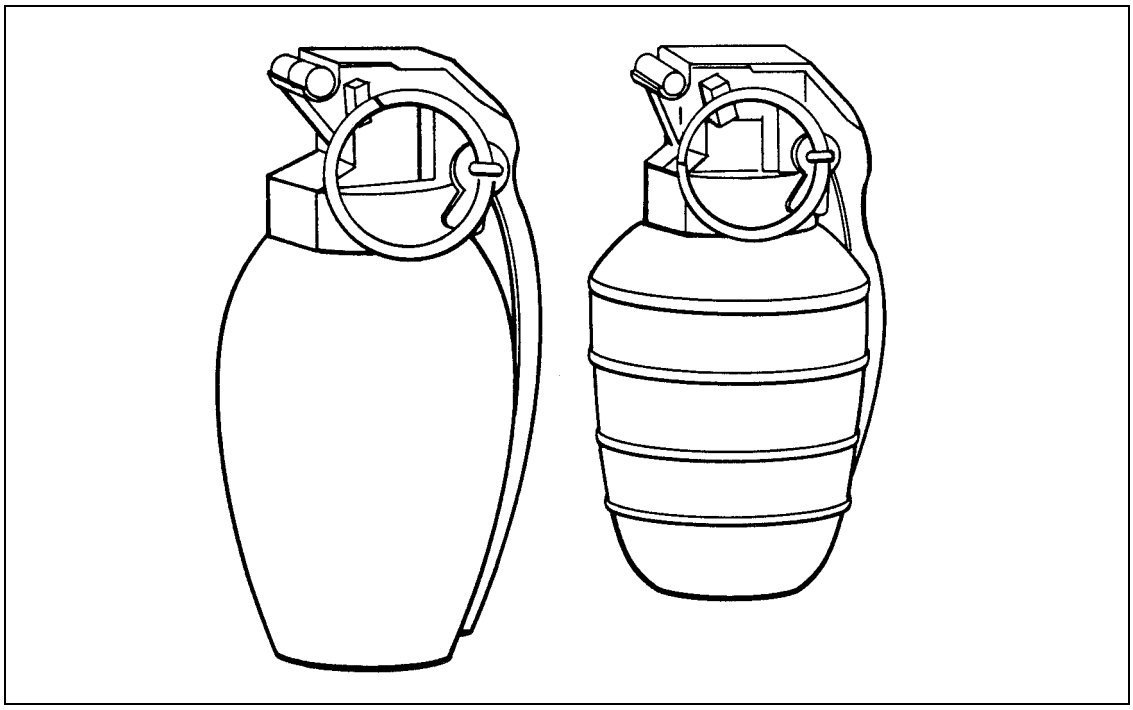

Figure F-19. HdGr 78 hand grenade.

F-20. HGR 79

- Type: Defensive. (Figure F-20)
- Weight: 370 grams.
- Length: 96 millimeters.
- Diameter: 58 millimeters.
- Body Material: Plastic.
- Filler Weight: 45 grams.
- Filler Material: Plasticized PETN.
- Fuze Type: Striker release.
- Fuze Delay: 3.5 to 4.5 seconds.
- Range Thrown: 45 meters.
- Effective Radius: 10 meters.

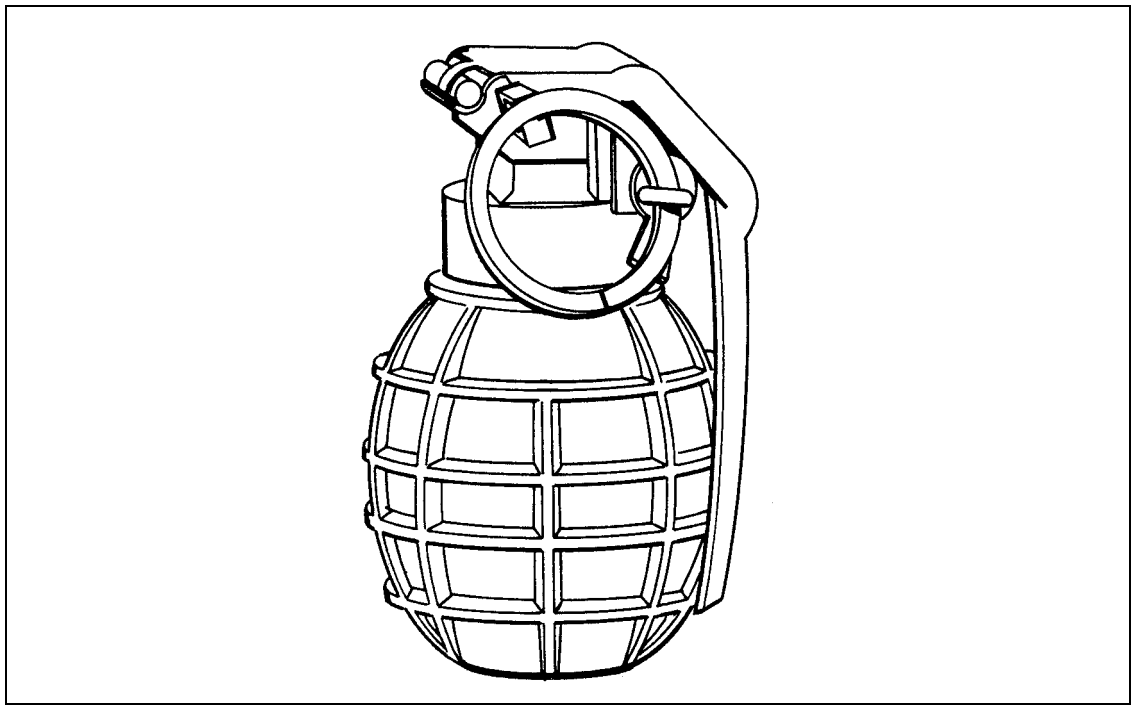

Figure F-20. HGr 79 hand grenade.

F-21. SPL HGR 84

- Type: Defensive. (Figure F-21)
- Weight: 490 grams.
- Length: 115 millimeters.
- Diameter: 61 millimeters.
- Body Material: Plastic.
- Filler Weight: 96 grams.
- Fuze Type: Striker release.
- Fuze Delay: 3.5 to 4.5 seconds nominal.
- Range Thrown: 35 to 40 meters.
- Effective Radius: 10 meters.

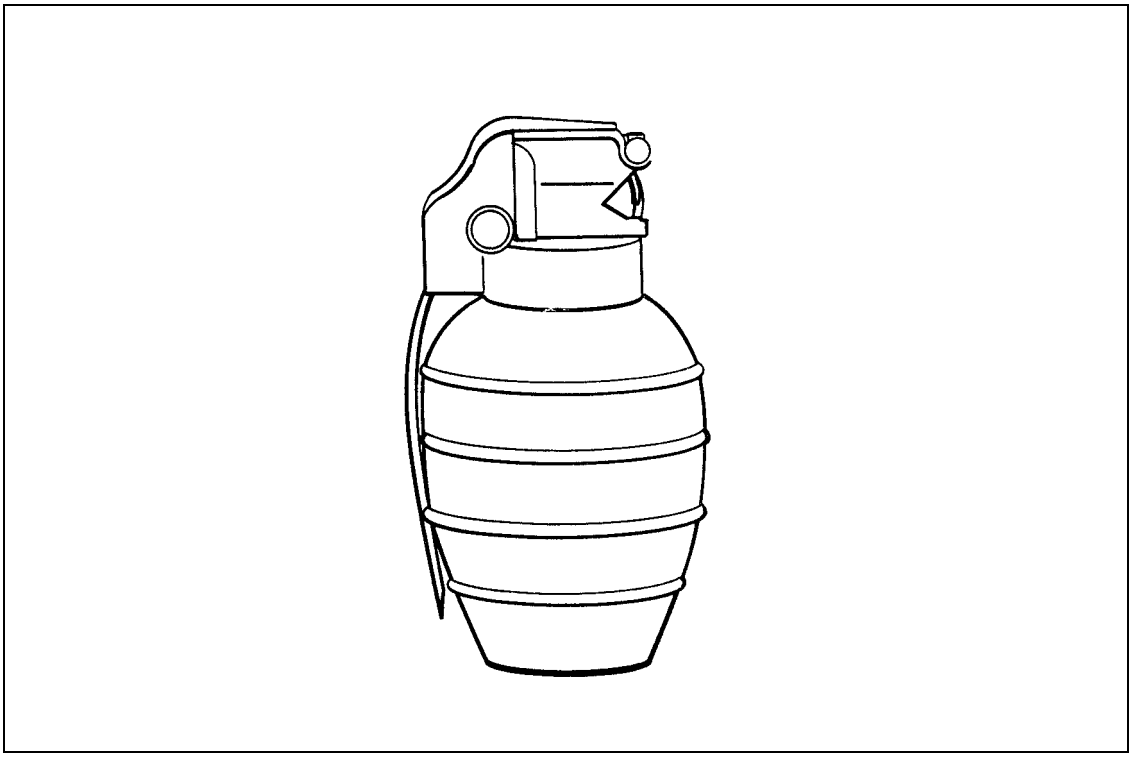

Figure F-21. Spl HGr 84 hand grenade.

F-22. HDGR 72

- Type: Defensive. (Figure F-22)
- Weight: 485 grams.
- Length: 115 millimeters.
- Diameter: 60 millimeter.
- Body Material: Rigid plastic.
- Filler Weight: 65 grams.
- Filler Material: Plasticized PETN.
- Fuze Type: Striker release.
- Fuze Delay: 3 to 5 seconds.
- Effective Radius: 10 meters.

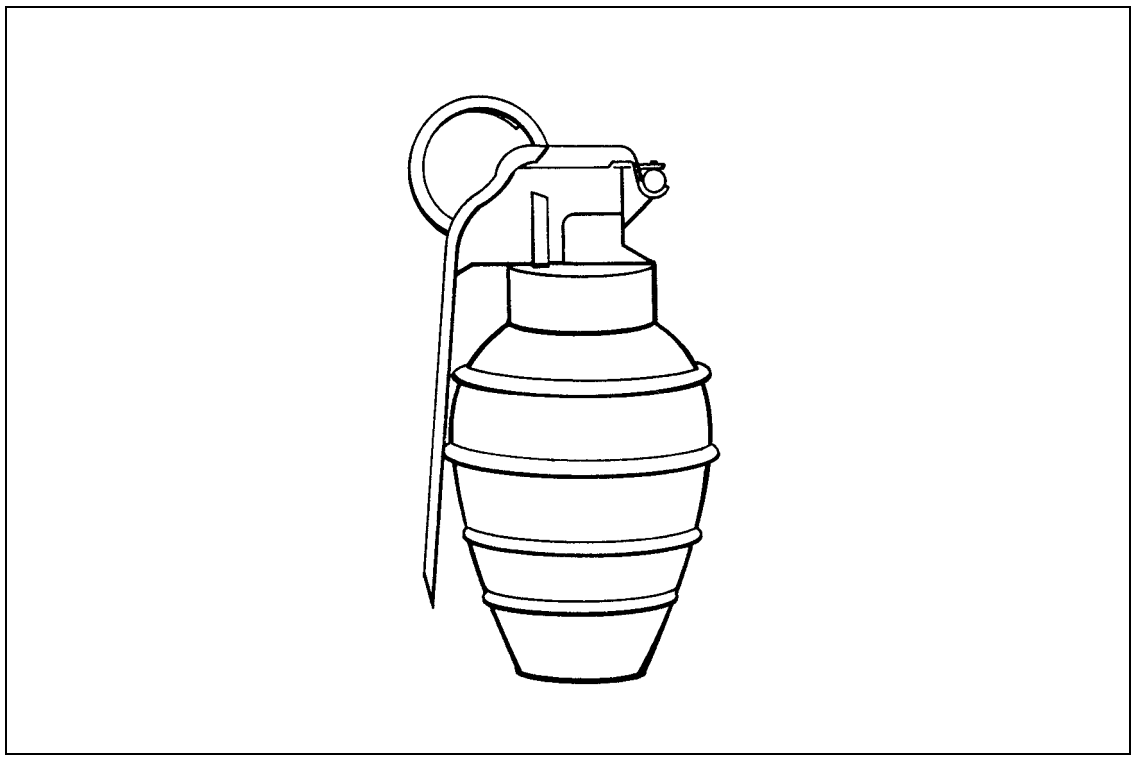

Figure F-22. HdGr 72 hand grenade.

F-23. HDGR 73

- Type: Defensive. (Figure F-23)
- Weight: 355 grams.
- Length: 91 millimeters.
- Diameter: 57 millimeters.
- Body Material: Plastic.
- Filler Weight: 37 grams.
- Filler Material: Plasticized PETN.
- Fuze Type: Striker release.
- Fuze Delay: 3 to 5 seconds.
- Effective Radius: 10 meters.

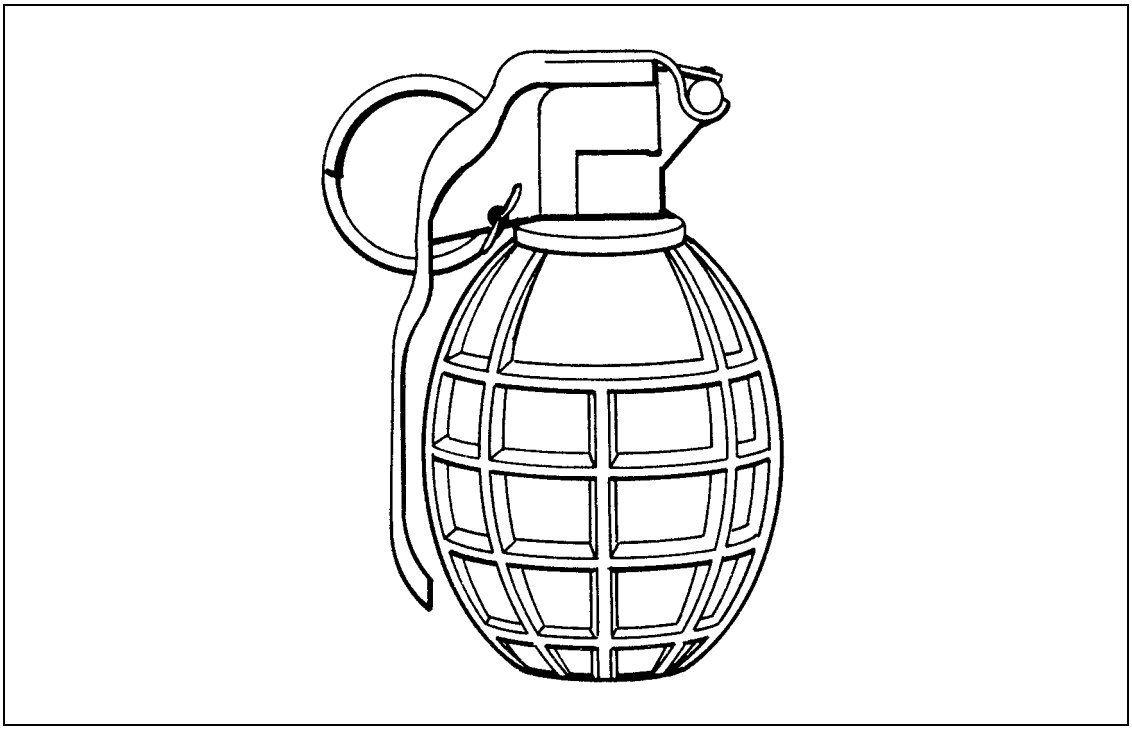

Figure F-23. HdGr 73 hand grenade.

APPENDIX G
REPRODUCIBLE FORMS

This appendix provides a blank copy of DA Form 3517-R, Hand Grenade Qualification Scorecard. This form is not available through normal supply channels. It may be reproduced locally on 8 1/2- x 11-inch paper.

HAND GRENADE QUALIFICATION SCORECARD

For use of this form, see FM 23-30. The proponent agency is TRADOC.

NOTE: In addition to the requirements on this scorecard, the soldier must throw two live fragmentation grenades to qualify.

A. DATE LIVE GRENADES WERE THROWN		B. INITIALS
C. NAME (*Last, First, Middle Initial*)		D. DATE
E. GRADE	F. SSN	G. UNIT

H. STATION	I. TYPE TARGET	J. GO	K. NO-GO	L. SCORER'S INITIALS
1	**Engage Enemy from Fighting Position at a Range of 35 Meters** *(Standing)*			
2	**Engage Bunker**			
3	**Engage 82-mm Mortar Position at 20 Meters** *(Kneeling)*			
4	**Engage Enemy Behind Cover at 20 Meters** *(Alternate Prone)*			
5	**Engage Trench at 25 Meters** (*Standing)*			
6	**Engage Wheeled Vehicle at 25 Meters** *(Kneeling)*			
7	**Identify Hand Grenades**			

M. QUALIFICATION STANDARD

		CHECK
PASSED 7	EXPERT	
PASSED 6	FIRST CLASS	
PASSED 5	SECOND CLASS	
PASSED 4 OR LESS	UNQUALIFIED	

N. SIGNATURE OF SCORER/OIC

DA FORM 3517-R (Revised)

DA FORM 3517-R, NOV 88, IS OBSOLETE.

STATION 1. Engage Enemy from Fighting Position at a Range of 35 Meters *(Standing)*

PERFORMANCE MEASURES	GO	NO-GO
A. Detonated at least one grenade within 5 meters of the center of target.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 1A through 1E within 15 seconds.		

STATION 2. Engage Bunker

A. Approached from blind side.		
B. Checked for bunker opening.		
C. Detonated grenade in bunker.		
D. Rolled away from bunker.		
E. Used proper grip.		
F. Use cook-off technique.		
G. Completed performance measures 2A through 2E within 15 seconds.		

STATION 3. Engage 82-mm Mortar Position at 20 Meters *(Kneeling)*

A. Detonated at least one grenade inside mortar position.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 3A through 3E within 15 seconds.		

STATION 4. Engage Enemy Behind Cover at 20 Meters *(Alternate Prone)*

A. Detonated at least one grenade within 5 meters of the center of target.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 4A through 4E within 15 seconds.		

STATION 5. Engage Trench at 25 Meters (*Standing*)

PERFORMANCE MEASURES	GO	NO-GO
A. Detonated at least one grenade inside trench.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		

STATION 6. Engage Wheeled Vehicle at 25 Meters *(Kneeling)*

A. Detonated within 1 meter of vehicle or within 5 meters of dismounting troops.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 6A through 6E within 15 seconds.		

STATION 7. Identify Hand Grenades

A. Selected fragmentation grenade to engage enemy soldiers.		
B. Identified M83 grenade as "White Smoke" or "HC smoke."		
C. Identified M18 grenade as "Colored Smoke" or "Purple (and so forth) Smoke." (*If specific color is stated, it must be the same color as on the training aid grenade used.*)		
D. Identified M7A2/A3 grenade as CS or riot control.		
E. Identified M14 grenades as incendiary.		

NOTES:

1. **FOR PERFORMANCE MEASURES 7A THROUGH 7E, IF THE EXAMINEE CANNOT CORRECTLY STATE THE NAME OF THE GRENADE BUT CAN CORRECTLY IDENTIFY ITS USE, THEN THE EXAMINEE IS SCORED A "GO."**
2. **EACH PERFORMANCE MEASURE AT EACH SECTION IS GRADED ON A PASS/FAIL STANDARD. A SOLDIER MUST PASS ALL OF THE STANDARDS TO RECEIVE A "GO" ON THAT STATION.**

REVERSE OF DA FORM 3517-R (Revised)

GLOSSARY

ammo	ammunition
AR	automatic rifle; army regulation
ARTEP	Army Training and Evaluation Program
ASP	ammunition supply point
BFV	Bradley fighting vehicle
BMP	a fighting vehicle made by the former Soviet Union
BN	battalion
CN	tear gas
comp	composition
CS	tear gas; combat support
CSS	combat service support
CLP	cleaning, lubricant, petroleum
DA	Department of the Army
DM	vomiting gas
EOD	explosive ordnance disposal
ETLBV	enhanced tactical load-bearing vest
FM	field manual; frequency modulated
HC	hydrochloric
HG	hand grenade
HQ	headquarters
HGQC	hand grenade qualification course
IAW	in accordance with
LCE	load-carrying equipment
MBA	main battle area
METL	mission-essential task list
METT-T	mission, enemy, terrain, troops, and time
mm	millimeter
MOPP	mission-oriented protective posture
NATO	North Atlantic Treaty Organization
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NSN	national stock number

PETN	pentaerythritol tetranitrate
OD	olive drab
OIC	officer in charge
PA	public address
RATELO	radiotelephone operator
RDX	cyclonite
REGT	regiment
ROE	rules of engagement
RSO	range safety officer
STX	situational training exercise
SOI	signal operations instructions
SOP	standing operating procedure
TA	teraphthalic acid
TH	thermate
TM	technical manual
TNT	trinitrotoluene
TRADOC	Training and Doctrine Command
US	United States
WP	white phosphorous

REFERENCES

SOURCES USED

These are the sources quoted or paraphrased in this publication.

ARTEP 7-8 Drill	Battle Drills for the Infantry Rifle Platoon and Squad, 3 March 2000.
ARTEP 7-8 MTP	Mission Training Plan for the Infantry Rifle Platoon and Squad, 29 September 1994.
FM 3-100.4/ MCRP 4-11B	Environmental Considerations in Military Operations. 1 June 2000.
FM 7-7J	Mechanized Infantry Platoon and Squad (Bradley). 7 May 1993.
FM 7-8	Infantry Rifle Platoon and Squad. 22 April 1992.
TM 9-1330-200-12	Operator's and Organizational Maintenance Manual for Grenades. 17 September 1971; with Changes 1-15, dated 20 February 1976 through 16 June 1995.
TM 9-1370-206-10	Operator's Manual for Pyrotechnic Signals. 31 March 1991; with Change 1, 10 March 1992.
USAIC Reg 40-24	Prevention and First Aid Treatment of Cold Injury. 30 January 1989.

READINGS RECOMMENDED

These sources contain relevant supplemental information.

AR 385-63	Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat. 15 October 1983.
FM 5-250	Explosives and Demolitions. 30 July 1998; with Change 1, 30 June 1999.
FM 21-11	First Aid for Soldiers. 27 October 1988; with Change 1, 28 August 1989, and Change 2, 4 December 1991.
TC 5-400	Unit Leaders' Handbook for Environmental Stewardship. 29 September 1994; with Changes 1-3, dated 3 October 1995 through 15 November 1999.

INTERNET WEB SITES

U.S. Army Publishing Agency: http://www.usapa.army.mil
Army Doctrine and Training Digital Library: http://www.adtdl.army.mil

HAND GRENADE QUALIFICATION SCORECARD

For use of this form, see FM 23-30. The proponent agency is TRADOC.

NOTE: In addition to the requirements on this scorecard, the soldier must throw two live fragmentation grenades to qualify.

A. DATE LIVE GRENADES WERE THROWN		B. INITIALS
C. NAME (*Last, First, Middle Initial*)		D. DATE
E. GRADE	F. SSN	G. UNIT

H. STATION	I. TYPE TARGET	J. GO	K. NO-GO	L. SCORER'S INITIALS
1	**Engage Enemy from Fighting Position at a Range of 35 Meters** *(Standing)*			
2	**Engage Bunker**			
3	**Engage 82-mm Mortar Position at 20 Meters** *(Kneeling)*			
4	**Engage Enemy Behind Cover at 20 Meters** *(Alternate Prone)*			
5	**Engage Trench at 25 Meters** (*Standing)*			
6	**Engage Wheeled Vehicle at 25 Meters** *(Kneeling)*			
7	**Identify Hand Grenades**			

M. QUALIFICATION STANDARD

		CHECK
PASSED 7	EXPERT	
PASSED 6	FIRST CLASS	
PASSED 5	SECOND CLASS	
PASSED 4 OR LESS	UNQUALIFIED	

N. SIGNATURE OF SCORER/OIC

DA FORM 3517-R (Revised)

DA FORM 3517-R, NOV 88, IS OBSOLETE.

STATION 1. Engage Enemy from Fighting Position at a Range of 35 Meters *(Standing)*

PERFORMANCE MEASURES	GO	NO-GO
A. Detonated at least one grenade within 5 meters of the center of target.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 1A through 1E within 15 seconds.		

STATION 2. Engage Bunker

A. Approached from blind side.		
B. Checked for bunker opening.		
C. Detonated grenade in bunker.		
D. Rolled away from bunker.		
E. Used proper grip.		
F. Use cook-off technique.		
G. Completed performance measures 2A through 2E within 15 seconds.		

STATION 3. Engage 82-mm Mortar Position at 20 Meters *(Kneeling)*

A. Detonated at least one grenade inside mortar position.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 3A through 3E within 15 seconds.		

STATION 4. Engage Enemy Behind Cover at 20 Meters *(Alternate Prone)*

A. Detonated at least one grenade within 5 meters of the center of target.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 4A through 4E within 15 seconds.		

STATION 5. Engage Trench at 25 Meters (*Standing*)

PERFORMANCE MEASURES	GO	NO-GO
A. Detonated at least one grenade inside trench.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		

STATION 6. Engage Wheeled Vehicle at 25 Meters *(Kneeling)*

A. Detonated within 1 meter of vehicle or within 5 meters of dismounting troops.		
B. Kept exposure time under 3 seconds.		
C. Returned to covered position after each throw.		
D. Used proper grip.		
E. Used proper throwing techniques.		
F. Completed performance measures 6A through 6E within 15 seconds.		

STATION 7. Identify Hand Grenades

A. Selected fragmentation grenade to engage enemy soldiers.		
B. Identified M83 grenade as "White Smoke" or "HC smoke."		
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D. Identified M7A2/A3 grenade as CS or riot control.		
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REVERSE OF DA FORM 3517-R (Revised)

FM 23-30 (FM 23-30)
1 SEPTEMBER 2000

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0021503

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